New Nouveau
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Open File Report 92-6

TILL GEOCHEMISTRY OF PART OF THE FOREST CITY (NTS 21 G/12) MAP AREA YORK COUNTY, NEW BRUNSWICK

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Natural Resources and Energy

Mineral Resources

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ABSTRACT

The Forest City map area straddles the Canada–United States border between New Brunswick and the State of Maine. The part of the Forest City map area within New Brunswick is entirely underlain by the Pokiok granite batholith. In contrast, the overlying basal till is dominated by pebbles of distal origin. However, the grain size and geochemical data for the till matrix suggest that it represents a mixture of distal and proximal components. Ablation till tends to be more granitic in both the matrix and pebble fractions.

Comparison between basal and ablation tills indicates that, for many elements, ablation till can be used as a proxy for basal till when the latter is not present at the sample site. The major discrepancy is with lithophile elements such as Th, U, and the rare earths, which tend to be present in greater abundance in ablation till samples.

The pebble lithology data for the till and the configuration of the element distribution patterns suggest that the till was derived from a source area to the north or north-northeast. However, a northwestern source area cannot be completely ruled out.

RÉSUMÉ

Le secteur cartographique de Forest City est à cheval sur la frontière du Canada et des États-Unis, entre le Nouveau-Brunswick et l'État du Maine. La partie du secteur cartographique située au Nouveau-Brunswick repose entièrement sur le batholite granitique de Pokiok. Par opposition, la couche sus-jacente de till de fond est dominée par des cailloux d'origine distale. La grosseur des particules et les données géochimiques de la matrice du till laissent supposer qu'elles représentent un mélange d'éléments distaux et proximaux. Le till d'ablation a tendance à être plus granitique dans la matrice et les fractions de cailloux.

Une comparaison entre le till de fond et le till d'ablation révèle que, sous le rapport de nombreux éléments, le till d'ablation peut être utilisé comme substitut proche du till de fond lorsque ce dernier est absent de l'emplacement d'échantillonnage. Les principales divergences touchent les éléments lithophiles comme le thorium, l'uranium et les éléments du groupe des terres rares, qui ont tendance à être plus abondants dans les échantillons de till d'ablation.

Les données lithologiques sur les cailloux du till et la configuration des modèles de distribution des éléments semblent indiquer que le till provient d'une source d'origine nord ou nord-est. On ne peut cependant pas éliminer complètement la possibilité d'une provenance nord-ouest.

TILL GEOCHEMISTRY OF PART OF THE FOREST CITY (NTS 21 G/12) MAP AREA, YORK COUNTY, NEW BRUNSWICK

INTRODUCTION

In 1990, a project was begun to study the Quaternary (surficial or regolith) geology and till geochemistry of the area overlying and adjacent to the southern Pokiok Batholith. This area comprises the northwest quadrant of the Fredericton (NTS 21 G; 1:250 000 scale) map area, consisting of the New Brunswick parts of the McAdam (21 G/11), Forest City (21 G/12), and Fosterville (21 G/13) map areas, and all of the Canterbury (21 G/14) map area (Figure 1).

There are three major reasons for conducting this project (Seaman 1990b). These are: (1) to determine the direction of till transport in the area, as an aid to mineral exploration; (2) to add to the till geochemistry data base for New Brunswick, and complement bedrock mapping and stream-sediment geochemistry programs that have been conducted in the area (Caron 1991; Pronk 1990, 1991); and (3) to collect basic Quaternary geology data on the area within the Forest Planning Zone of the St. Croix International Waterway Commission.

Work on the Canterbury area was completed as part of an MSc thesis project in the Geology Department of the University of New Brunswick (Balzer 1992), while work on the McAdam and Fosterville areas is ongoing. The current report deals specifically with the till geochemistry of the Forest City map area. It contains only a brief description of the surficial geology of the area because detailed description of the Quaternary geology of the Forest City and Fosterville areas combined is planned when mapping of the latter area is completed. It is recommended that the current report be used in conjunction with the Forest City topographic map.

LOCATION AND ACCESS

The Forest City (NTS 21 G/12) map area lies in the upper reaches of the St. Croix River watershed area. This study was conducted in the northeastern quarter of the map area, a land area

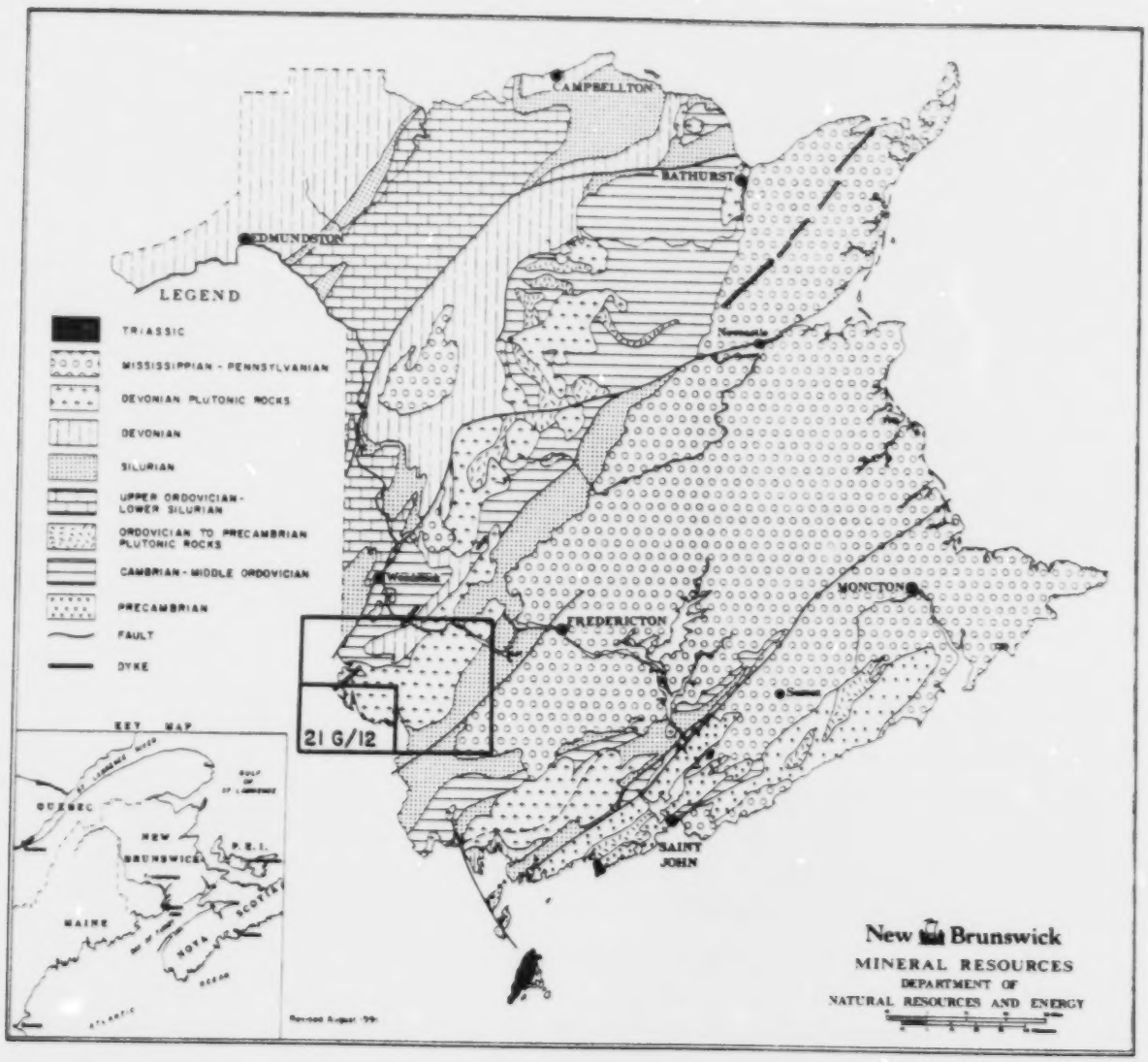

Figure 1. Location of the Forest City map area (NTS 21 G/12), and the southern part of the Pokiok Batholith project area.

of approximately 250 km^2, bounded to the north by latitude 45°45'N, to the east by longitude 67°30'W, and to the west by Grand Lake and south by Spednik Lake of the Chiputneticook Lakes (St. Croix River system). This part of the map area lies in New Brunswick; the remainder lies within the State of Maine.

Access is good throughout the study area. In the western part of the area, a local road runs northward from Forest City to connect with Highway 122 near Fosterville, to the north of the map area (Figure 2). A major east-west logging access road extends across the northern part of the map area, from the Forest City road, about 1 km north of the map area, through to Highway 630, linking the villages of Canterbury and St. Croix, to the east of the map area. An extensive network of logging roads and trails branch from these two roads.

ACKNOWLEDGMENTS

Field assistance was provided by Garrett Bell, who also sectioned the pebbles collected for lithologic identification. William Gardiner and D.V. Venugopal aided in identifying some of the less obvious pebble lithotypes. Sample preparation and grain size determinations were performed by Rex Boldon. Atomic absorption spectroscopy analyses were performed by Valeria Rinco. Other analyses were performed by Bondar-Clegg & Company Ltd. and Activation Laboratories Ltd.

Figures were drafted by L.G. Johnson and P. Evans; the report was edited by B. Carroll.

SAMPLING AND ANALYTICAL PROCEDURES

FIELD PROCEDURES

Field work for this study was carried out during the summer of 1990. Till sampling was based on a 2 km grid, the grid points comprising the intersections of the even numbered UTM easting lines and the odd numbered UTM northing lines on the NTS map sheet. This grid system was chosen in order to ensure compatibility with the grid previously used for the Rollingdam (NTS 21 G/6) map area (Chiswell and Long 1989). A similar grid has been used for the Canterbury (NTS 21 G/14) map area (Balzer 1992), and is being used for the ongoing work on the McAdam (NTS 21 G/11) and Fosterville (NTS 21 G/13) map areas.

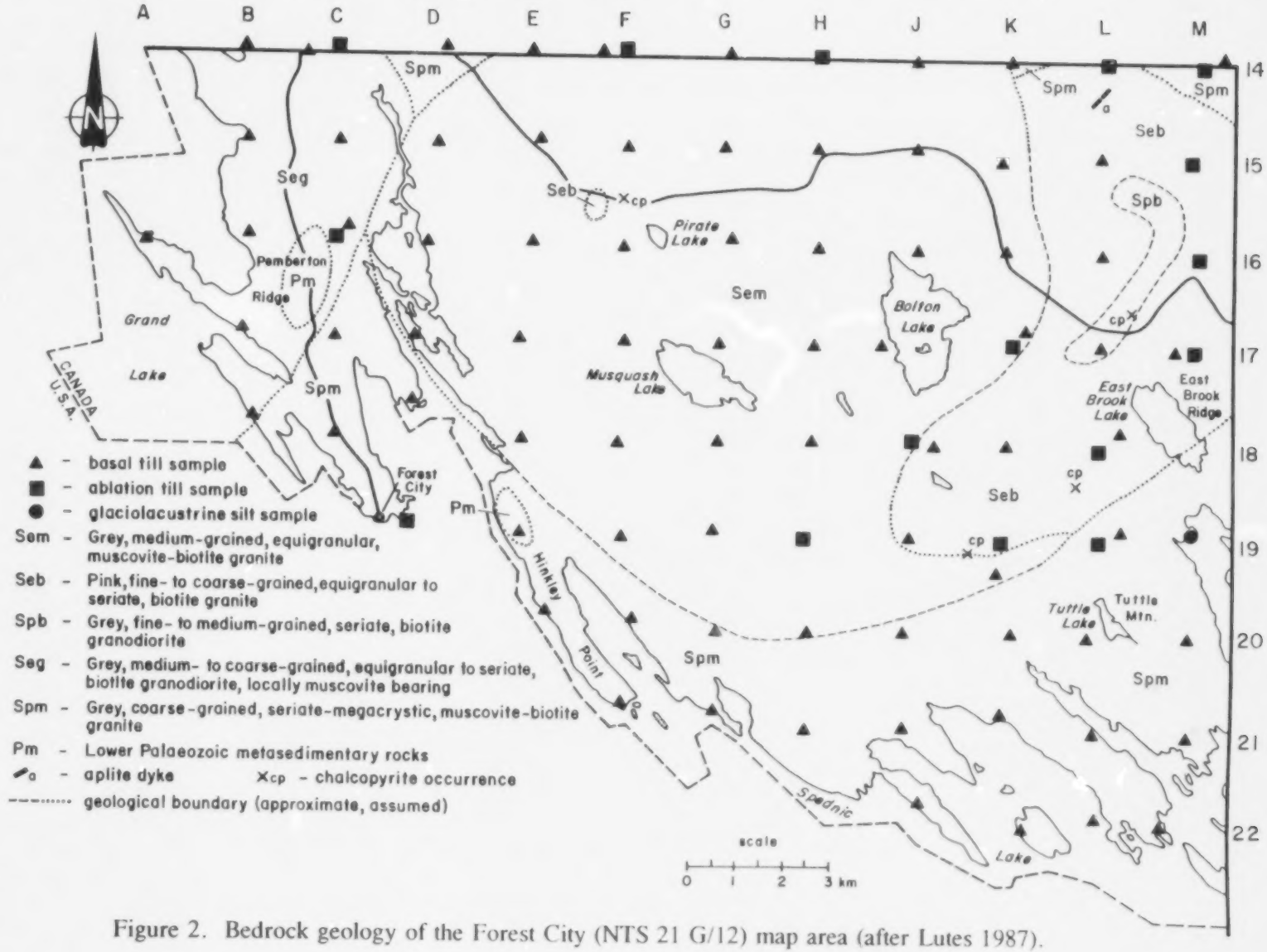

Figure 2. Bedrock geology of the Forest City (NTS 21 G/12) map area (after Lutes 1987).

A total of 77 grid points were identified within the study area. An additional 7 grid points lying just above the northern boundary of the Forest City map area [in the Fosterville (21 G/13) map area] were also included in this study so as to provide complete coverage of the northern part of the area. The aim of the sampling component of the study was to obtain a basal till sample from the geographic location of each grid point. However, for those grid points that fell within water bodies, or on the other side of the International border, a new point on the nearest New Brunswick land area was selected as the sampling target. Each grid point or alternate sampling target was accessed by a pace-and-compass traverse from the nearest road access point. Sample sites were located as close as practicable to the identified target points. If a target site was boggy or underlain by material other than basal till, or if a roadcut or other subvertical exposure was present nearby, the actual sample site was moved up to about 300 m in any direction from the target site. In a number of cases the target sites corresponded with extensive areas underlain by ablation till. In these cases, the ablation till was sampled; however, an alternate basal till site was also sampled if such material could be readily obtained within 1 km of the target site, so as to permit comparison of the geochemical and lithological characteristics of the two different types of material. A total of 10 such alternate sites were sampled. Two samples were also collected for grid point D 17 to permit comparison between compact basal lodgment till and looser basal meltout till. In addition, at site M 19, the C-horizon sample was collected from what appears to be glaciolacustrine silt, while the pebble sample was presumably derived from underlying ablation till. The UTM coordinates and elevation of each sample site are detailed in Appendix A; the site locations are plotted on Figure 2.

Standard sampling procedure involved the excavation by shovel of sample pits about 0.5 m^2 in area extending at least 0.1 m into the C-horizon, or the cleaning up and deepening, if necessary, of roadcut or other subvertical faces. Sample pits varied from 0.49 to 1.00 m in depth (measured with a tape measure), while sections (sometimes composite) extended to depths of up to 1.96 m — the average depth for all sites was 0.83 m. Three samples were collected from each site, comprising: (1) a sample of approximately 5 kg of C-horizon material (soil parent material) for geochemical and grain size analysis; (2) a sample of 50 to 100 C-horizon pebbles, ranging from coarse gravel to coarse cobble size (1.6 to 25.6 cm in b-axis dimension; cobble clasts were reduced to one fragment of gravel size in the field), for lithological analysis; and (3) a sample of approximately 1 kg of B-horizon material, for future geochemical analysis and forest-site classification purposes. To minimize the prospect of contamination, the C-horizon sample was loosened using a stainless steel hunting knife and placed in the sample bag by hand (no jewelry was worn during the sampling program). Test pits were filled in and the turf replaced following sampling. This leads to some difficulty in relocating test pits should it become necessary to re-excavate them, but does result in minimal environmental impact.

Table 1. Results of ACTLABS' Analyses of Standard Samples

Element	LKSD-1			LKSD-2			LKSD-4		
	First Analysis	Second Analysis	Expected Value*	First Analysis	Second Analysis	Expected Value*	First Analysis	Second Analysis	Expected Value*
As(ppm)	36	36	40 ± 2	12	11	11 ± 1	16	16	16 ± 1
Au(ppb)	7	<2	5.1 ± 2.4	6	<2	3.2 ± 2.0	<2	3	2.5 ± 1.6
Ba(ppm)	480	480	430 ± 40	860	750	780 ± 76	280	420	330 ± 55
Co(ppm)	9	10	11 ± 1	15	13	17 ± 1	10	11	11 ± 1
Cr(ppm)	29	28	31 ± 3	55	50	57 ± 8	37	34	33 ± 6
Cs(ppm)	<1	1	1.5 ± 1.2	3	2	3.0 ± 0.6	1	2	1.7 ± 0.6
Fe(%)	2.55	2.82	2.83 ± 0.10	4.05	3.63	4.29 ± 0.24	2.79	2.92	2.82 ± 0.20
Hf(ppm)	4	4	3.6 ± 0.5	8	7	7.0 ± 1.0	3	4	2.8 ± 0.5
La(ppm)	14	17	16 ± 2	67	59	68 ± 6	27	29	26 ± 2
Mo(ppm)	6	6	10 ± 2	INT	INT	<5	INT	INT	<5
Ni(ppm)	<20	38	16 ± 3	50	<20	26 ± 4	<20	<20	31 ± 5
Rb(ppm)	17	26	24 ± 7	77	65	85 ± 10	21	28	28 ± 10
Sb(ppm)	1.3	1.4	1.2 ± 0.1	1.2	0.9	1.1 ± 0.1	2.0	1.8	1.7 ± 0.1
Sc(ppm)	7.2	7.9	9 ± 2	12	11	13 ± 2	7.0	7.1	7 ± 1
Sn(ppm)	4	8	16 ± 4	1	1	5 ± 2	1	2	5 ± 1
Ta(ppm)	<0.5	<0.5	0.32 ± 0.03	1.2	<0.5	0.77 ± 0.08	<0.5	<0.5	0.38 ± 0.04
Th(ppm)	1.9	2.2	2.2 ± 0.3	13	12	13.4 ± 1.0	5.5	5.3	5.1 ± 0.7
U (ppm)	9.6	11	9.7 ± 1.0	7.8	7.2	7.6 ± 0.9	37	38	31.0 ± 1.8
W (ppm)	<1	<1	<4	<1	<1	<4	<1	<1	<4
Yb(ppm)	2.3	2.6	2.1 ± 0.5	4.4	4.2	4.0 ± 0.5	2.5	2.6	2.0 ± 0.2
Zn(ppm)	350	338	331 ± 22	236	184	209 ± 18	213	229	194 ± 19

Note: Expected value (*) is mean and standard deviation of 19 to 133 replicate analyses by a number of different laboratories.

INT – Interelement interference
ACTLABS – Activation Laboratories Ltd.

Four additional samples were obtained from the stratigraphic section (site FC 22) exposed in a roadside borrow pit near the upper end of Hinkley Point, approximately 300 m southeast of grid point E 19. These samples comprised a sample from the surface ablation till, and a sample each from the top, middle, and bottom of the exposed basal till. These samples were collected so as to permit an evaluation of geochemical and lithological changes with depth.

ANALYTICAL PROCEDURES

Sample preparation was undertaken by the geochemical laboratory of the New Brunswick Department of Natural Resources and Energy (DNRE). Samples were sieved to separate the minus 0.063 mm (silt plus clay) fraction, which was used for geochemical analysis. Five suites of analyses were obtained: (1) Ag, Co, Cu, Fe, Mn, Ni, Pb, and Zn were determined by the DNRE geochemical laboratory using atomic absorption analysis following hot HNO_3 extraction; (2) Ag, Bi, and Cd were determined by Bondar-Clegg & Company Ltd. using atomic absorption analysis following HCl-HNO_3 extraction (Ag was detected in only two samples, L 18A and 22Bm, both at 0.2 ppm, while Bi was detected only in sample L 14A, at 2 ppm); (3) Hg was determined by Bondar-Clegg & Company Ltd. by cold vapour atomic absorption following HNO_3-HCl-$SnCl_2$ extraction; (4) Ag, As, Au, Ba, Br, Cd, Ce, Co, Cr, Cs, Eu, Fe, Hf, Ir, La, Lu, Mo, Na, Ni, Rb, Sb, Sc, Se, Sm, Sn, Ta, Tb, Te, Th, U, W, Yb, Zn, and Zr were determined by Bondar-Clegg & Company Ltd. using neutron activation analysis [NAA] (Ag, Cd, Ir, Sn, and Te values were below the detection limit for all samples); and (5) Ag, As, Au, Ba, Br, Ca, Ce, Co, Cr, Cs, Eu, Fe, Hf, Hg, Ir, La, Lu, Mo, Na, Nd, Ni, Rb, Sb, Sc, Se, Sm, Sn, Sr, Ta, Tb, Th, U, W, Yb, and Zn were determined by Activation Laboratories Ltd. using neutron activation analysis (Ag, Hg, Ir, and Se values were below the detection limit for all samples while most samples exhibited interelement interference in the Mo analyses). The DNRE and Bondar-Clegg analyses were performed early in 1991. The Bondar-Clegg NAA results appeared to contain an analytical anomaly in which the analyses for some elements suggested that the first half of the samples belonged to a different population than the second half of the samples (most evident with the Mo data). Unfortunately, the samples were inadvertently shipped without standards or duplicates so that the validity of this apparent discrepancy could not be assessed from the available data. Consequently, a second split of the same samples was analyzed by ACTLABS in late 1991 along with five sample duplicates and duplicates of three standards (Table 1 lists the results for the analyses of the standards, and the expected values; except for Ni and Sn, all values are reasonable). Because the ACTLABS data set is verified by duplicates and standards, these values were used in preference to the Bondar-Clegg values for the contoured element-distribution maps, for those elements analyzed by both labs. Similarly, DNRE atomic absorption results were used

in preference to either ACTLABS or Bondar-Clegg neutron activation results. The contoured element-distribution maps are presented in Appendix B. However, for the users' benefit, the entire geochemical data set is summarized in Appendix C.

The relative proportions of sand, silt and clay in the C-horizon samples were determined by hygrometer techniques. The results generated were in terms of the Wentworth grain-size classification scheme [i.e., sand–silt boundary at 0.625 mm; silt–clay boundary at 0.0039 mm (Tanner 1978)]. These results and the percentages of the different lithologic components of the pebble fractions of the tills are summarized in Appendix D. Maps outlining the distribution of the major lithotypes are presented in Appendix E.

Calculation of mean geochemical values and standard deviations was performed using Lotus 1-2-3 R3 ®. Element distribution maps were contoured by hand, beginning at the mean and using a contour interval of one standard deviation. (The mean and standard deviation values used for these maps differ from those listed in Appendix C in that extreme high values were deleted in their calculation, so as to avoid skewing the mean to an excessively high value). Pebble component maps were also contoured by hand, using a contour interval equal to one-fifth of the data range. Contour lines were plotted on the assumption of proportional spacing between data points.

PHYSIOGRAPHY AND GEOLOGY

PHYSIOGRAPHY

The Forest City map area lies within the Pokiok Hills subdivision of the St. Croix Highlands subunit of the New Brunswick Highlands. This area comprises "a group of rocky, steep-walled ridges, generally with a northwest-southeast alignment reflecting glacial erosion" (Rampton *et al.* 1984, p. 73). The maximum elevation in the study area, 285 m AMSL (above mean sea level), is found in the north-central part of the area (between Sites G 14, G 15, H 14, and H 15). In contrast, Spednic Lake lies at an elevation of about 116 m AMSL. Local relief is generally in the range of 50 to 70 m but in some areas exceeds 100 m. Higher elevations and greater local relief are found in the part of the map area across the International Border; maximum elevation is 367 m AMSL for the western peak of Greenland Mountain.

Drainage in the study area is strongly controlled by bedrock structure. The streams trend southeastward or, less commonly, northwestward. The larger lakes consist of a series of

interconnected northwest-southeast-oriented basins. Locally, drainage has been deranged by glacial deposits, resulting in the formation of several small lakes and numerous boggy areas.

BEDROCK GEOLOGY

According to Lutes (1987), the Forest City map area is almost entirely underlain by the Skiff Lake Granite phase of the Pokiok Batholith. Previously thought to be of Lower Devonian age (Lutes 1987), this batholith has recently been dated as largely Upper Silurian age (Bevier and Whalen 1990; Whalen and Theriault 1990).

Lutes (1987) divided the Skiff Lake Granite into five mappable units (Figure 2). The oldest and most extensive element of the Skiff Lake Granite, Unit Spm, is a coarse, grey, porphyritic, two-mica granite. It occurs in the southern part of the study area and in small patches in the northern part of the area (it is the major subunit to the north, outside of the study area) and underlies approximately 32% of the area. Unit Seg, presumably intrusive into Unit Spm, is a medium to coarse, biotite granodiorite underlying the western 12% of the study area. Unit Sem, presumably intrusive into both Units Spm and Seg, is a grey, medium-grained, equigranular, two-mica granite that occurs in the central part of the area and underlies about 42% of the study area. The northeastern 13% of the study area is underlain by Unit Seb, a pink, fine to coarse, biotite granite that also occurs as a small body (about 1 km^2 in extent) to the northwest of Pirate Lake. The larger area of Unit Seb contains a small intrusion of Unit Spb, a grey, fine to medium, porphyritic, biotite granodiorite.

Lutes (1987) outlined two megaxenoliths of mica schist and hornfels (Unit Pm) lying within the Forest City area. The largest, at Pemberton Ridge on the Forest City road, was also mapped by Smith (1965) but with a northwest-southeast orientation. New logging roads reveal that the second, at the northern end of Hinkley Point, is less extensive than inferred by Lutes (1987). Several granite outcrops were noted in the eastern part of this area and till sample site E 19 bottomed on granite.

SURFICIAL MATERIALS

Gadd (1973) mapped three major surficial units in the Forest City area. These were, in order of importance, till (i.e., largely basal till), bedrock (i.e., bedrock covered by a thin veneer

of glacial deposits), and moraine (i.e., dominantly ablation till). Three areas of morainal deposits were mapped: a major area along the valley containing Big and Little La Coote streams, and minor areas at the north end of Bolton Lake and between Bolton and Tuttle lakes. Bedrock was mapped as an area extending from around Musquash Lake, across to the south of Bolton Lake, and then northward up the east side of Bolton Lake, with a projection to the southeast including East Brook Ridge and Tuttle Mountain. Till was mapped as covering the remainder of the area, with the exception of minor ice-contact stratified drift, outwash channel, and bog deposits. Additional small ablational and glaciofluvial deposits were identified by Seaman (1982).

During the current project, further small areas of ablation moraine and ice-contact deposits were identified. However, the major discrepancy with respect to the earlier work concerns the bedrock unit mapped by Gadd (1973). The area within this unit is indistinguishable from the area that he mapped as blanketed by till. Not one of the 20 holes dug in basal till within the limits of this bedrock unit reached bedrock, while two of the holes dug within the area mapped as till did bottom on bedrock (Sites E 19 and G 14): the average depth of excavation was about 0.8 m in both units (Seaman 1990b). In general, it appears that bedrock occurs close to the surface primarily in the more topographically rugged areas, such as the Tuttle Mountain area and the area to the northwest of Bolton Lake, and near the crests of other major hills. Elsewhere, the average till thickness probably exceeds 1 m (Seaman 1990b).

BASAL TILL

The most obvious characteristic of the basal till in the Forest City area is the widespread distribution of granitic boulders over the surface. Boulder cover ranges from 1% to virtually 100%, and exceeds 5% at more than half of the sample sites. The boulders can be quite large, with maximum dimensions in the order of 10 m; they commonly exceed 2 m in size.

Previous studies of glacial transport in central and southwestern New Brunswick have generally identified relatively short distances of glacial transport: in the Rollingdam area, Chiswell (in press) documented displacement of till litholigic boundaries by 1 to 4 km with respect to the source bedrock boundaries; in central New Brunswick, Hornibrook *et al.* (1991) documented a maximum displacement of 3 km for heavy minerals from tills; and in the Canterbury area, Balzer (1992) has identifed pebble dispersal trains 8 to 10 km in length, and matrix geochemical dispersal of 2 to 5 km. In all of the above cases, the dispersal was reported to be in the direction parallel to the dominant striae trend of the area. However, preliminary work over the Carboniferous rocks to the south of Fredericton has suggested glacial transport of some clasts as much as 50 km to the

north of the source outcrop, in a direction other than that indicated by striae (Seaman 1990a).

Given the short distance of sediment transport reported from most of the nearby areas, and the abundance of overlying granitic boulders, it could be expected that the basal till of the Forest City area would be a proximal granitic till, with its components derived largely from the underlying Pokiok Batholith. However, this does not turn out to be the case for the pebble component of the till. More than half of the basal till pebble samples collected contained less than 10% Pokiok granite or probable xenolith clasts. Instead, this component of the till is largely of distal origin, dominated by clastic sedimentary clasts with associated felsic volcanic and assorted mafic igneous clasts derived from the Miramichi Terrane (cf., Fyffe and Fricker 1987) that lies a minimum of 5 to 25 km to the west through to the north of the individual sample sites. The pebble sample from site K 21 contains a pebble of pyritiferous, pink felsic volcanic breccia, most likely derived from a volcanic belt associated with red manganiferous siltstone that lies a minimum of 23 km to the west or 32 km to the north of the site (W. Gardiner, personal communication, 1992). The overall pebble composition of the till suggests that its most likely source area is to the north to north-northeast, though a source further to the west cannot be completely ruled out (W. Gardiner, personal communication, 1992).

In contrast to the pebble fraction, the matrix of the basal till appears to contain a significant proximal component. It is very sandy (Figure 3), and much coarser than expected of a sediment-rich till (M. Hayter, personal communication, 1990), suggesting significant incorporation of granitic material. The probable cause for the combination of distal pebbles in a proximal matrix may be found in the nature of the underlying granite. Weathered granite has been observed in a number of locations on the Pokiok Batholith, both within the Forest City area and in adjacent areas (e.g., Broster and Seaman 1991). The result of glacial flow over the batholith was probably a dilution of distal components in the matrix of the till by the assimilation of granitic sand and friable pebbles from the weathered bedrock. However, the lack of a significant input of hard pebbles would result in a reduction in the comminution of the remaining distal pebbles. Certainly, the preservation of a friable clast such as the pyritiferous volcanic breccia from site K 21 over a distance of more than 20 km suggests that clast comminution was not significant during till transport and deposition in this area.

The basal till in the Forest City area can be broken down into four lithologic subcategories, based on the relative abundances of sedimentary and granitic clasts. These subcategories are listed in Table II. However, this subdivision is artificial, since the till actually comprises a single stratigraphic unit. The latter interpretation is based on several lines of evidence, as follows:

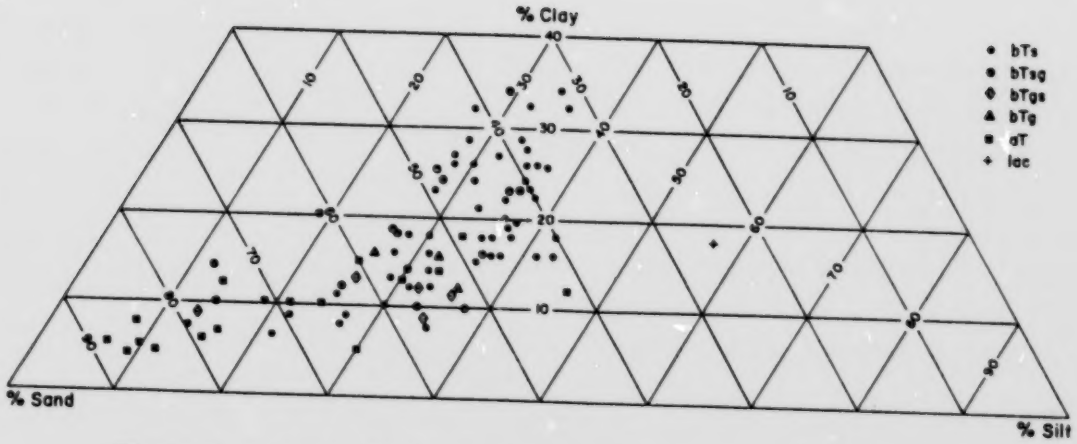

Figure 3. Ternary plot of till texture, Forest City (21 G/12) map area.

Table 2. Basal Till Lithologic Subcategories

Lithologic Component	bTs	bTsg	bTgs	bTg
A	55-90%	40-60%	20-39%	0-19%
B	0-19%	20-40%	50-74%	75-100%
C	2-24%	6-16%	2-11%	0-4%
D	0-15%	0-11%	0-6%	0-3%
E	0-6%	0-4%	0-2%	0-1%

A - Cambrian through Silurian age sedimentary clasts (primarily clastic, but including minor chert) and their metamorphic equivalents; includes probable Pokiok Batholith xenolith clasts and minor, possible Carboniferous sandstone and siltstone clasts

B - Pokiok Batholith granitic, granodioritic and aplitic clasts

C - Basaltic, dioritic, diabasic, gabbroic clasts, and their metamorphosed equivalents, of various ages

D - Felsic volcanic clasts, of various ages, and their metamorphic equivalents

E - Vein quartz or weathered quartz-carbonate clasts (not including quartz veins in identifiable metasedimentary or metavolcanic rocks)

1. No evidence for multiple basal till units has been observed in the area.
2. There is no significant textural difference between the four lithologic subcategories. The basal till is a silty clayey sand to silty sand (Figure 3), generally gravelly to cobbly. The sediment-rich subcategory includes both the finest and the coarsest of the basal till samples.
3. A ternary plot of the lithologic composition of the till, based on the sedimentary, granitic, and felsic volcanic plus mafic components combined, and recalculated to 100% (Figure 4), exhibits a linear trend from sediment-rich till containing significant quantities of felsic volcanic and mafic clasts through increasingly granite-rich till with proportionally less of the other clast types. This suggests that the granite-rich till differs from the sediment-rich till only in that more of the local granite has been assimilated.
4. The till at the sites containing the most granite either directly overlie bedrock (sites E 19 and G 14), or grade downward into a "grus"-like deformation till derived from underlying weathered granite (site J 16). In addition, the basal till at the borrow pit (site FC 22) to the southeast of site E 19 has a higher granite content at its base than at the top or in the middle (13% vs. 9% and 7%, respectively). Combined, this data suggests that the granite content increases with depth in the till, being highest immediately above the bedrock surface. This is in accord with point 3, above, since assimilation of granitic clasts would be expected to be greatest at the till/bedrock interface.

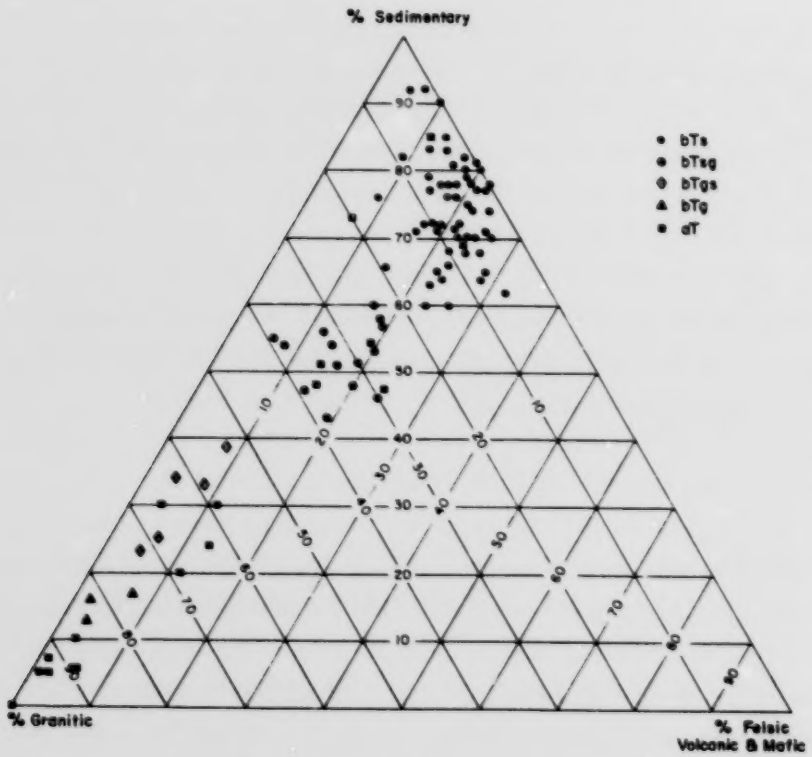

Figure 4. Ternary plot of till pebble lithology, Forest City (21 G/12) map area.

5. Finally, there are no apparent geochemical differences between the four compositional subcategories.

Basal till subcategory bTs is dominant in the area, being present at 71% of the sites sampled. Basal till bTsg occurs at 19% of the sample sites, basal till bTgs at 6%, and basal till bTg at only 4%.

ABLATION TILL

Ablation deposits in the Forest City area occur in three forms: (1) as extensive, mappable areas of rolling to hummocky, bouldery ablation moraine, as mapped by Gadd (1973); (2) as an unmappable patchy veneer or blanket overlying basal till, as at the borrow pit to the southeast of site E 19 (site FC 22); and (3) as boulder accumulations of varying density that occur on the basal till surface. The fact that the later occurrences are of ablational origin rather than the result of erosion or soil-forming processes as suggested by Gadd (1973) is indicated by the extremely local variability in surface boulder concentration and by the occurrence of the boulders on till containing few, if any, granitic clasts of any size. For example, the grid point for sample site D 16 comprises an essentially unvegetated accumulation of granitic boulders, most of which exceed 1 m in diameter. The sample site 150 m to the west has a surface granite boulder cover of about 40%, but the 50-pebble sample from the basal till contained not a single granitic clast.

Texturally, the ablation till is a silty sandy gravel or silty gravelly sand, generally cobbly or bouldery. The fine fraction is generally dominated by sand, with clay being less than 20% (Figure 3). Lithologically, the ablation till lies within the same range as the basal till (Figure 4). However, a greater percentage of the ablation till samples lie in the more granitic fields. This may indicate that the ablation till was derived from ice flowing in a different direction, as previously suggested (Seaman 1990b), but is now thought to be more likely due to derivation of the material, in variable amounts, from both the local basal till and the local bedrock.

SOILS

The soils of the Forest City area are podzolic — characterized by the presence of a leached, ashy grey Ae horizon (Wicklund and Langmaid 1953), which at the sample sites varies from less than 1 cm thick and discontinuous on fine-grained basal till to as much as 20 cm thick on excessively drained ablation till. However, the typical thickness is in the range of 1 to 5 cm. The measured soil thicknesses vary from 33 to 80 cm (to the top of the C-horizon), with a mean

thickness of about 52 cm. The soil parent materials vary from silty loam through loam and sandy loam to loamy sand.

Wicklund and Langmaid (1953) describe most of the soils in the area as shaly loams, derived from till parent material. They outlined minor areas of gravelly sandy loam derived from till (ablation?), residual material (i.e., weathered granite), or alluvial (glaciofluvial or ablational?) gravels. The current project has revealed that these coarser soils are much more extensive than indicated by Wicklund and Langmaid (1953).

TILL GEOCHEMISTRY

Contoured element-distribution patterns for the Forest City area are presented in Appendix B. Most of these patterns exhibit north-south to northeast-southwest trends, which suggests that till transport may have been in a southerly to southwesterly direction, as also suggested by the pebble lithology data (noted above). In addition, moderate copper values occur to the south to southwest of the three chalocopyrite occurrences identified in the eastern part of the area by Lutes (1987) (cf., Figure 2), though a similar relationship does not hold with Lutes' (1987) chalcopyrite occurrence to the northwest of Pirate Lake. (In this case the nearest anomalous area lies to the north.)

Comparison of the average elemental values of the area with average or median values reported for different rock types by Rose *et al.* (1979) and Krauskopf (1967) is revealing (Table 3). Eighteen percent of the elements exhibit average values similar to those for shale or sandstone; another 18% exhibit average values similar to those for granite; while most of the remainder (45%) exhibit average values suggesting a mixing of sedimentary and granitic material, with or without a mafic component. This tends to confirm that the fine fraction of the tills comprise a mixture of distal and proximal material, as suggested above.

Since considerable thicknesses of ablation till cover extensive areas of the Pokiok Batholith, part of this study involved the sampling of ablation till for geochemical comparison with basal till to see if ablation till can be used as a proxy for basal till in geochemical exploration when the latter is not available. The results suggest that, for most elements, this can be done. Comparison of ablation till geochemical values with adjacent basal till values on the element-distribution maps in Appendix B indicates close accordance in most cases. In addition, comparison between the mean values for each element for the two different till types suggests that they belong to the same

Table 3. Comparison of Forest City Average Elemental Values with Average Values Reported for Different Rock Types

Element	Correlation	Average (Forest City)	Average (mafic)	Average (granitic)	Average (sandstone)	Average (shale)
Ag	high	0.6	0.1	0.037	0.25	0.19
As	sh	10.5	1.5	2.1	1.2	12.0
Au	g	0.002	0.0032	0.0023	0.005	0.004
Ba	m + g + ss + sh/4	418	330	840	170	550
Br*	sh	7.5	3.6	1.3		6
Cd	m + g + sh/3	0.2	0.2	0.1	0.0x	0.3
Ce	high	103	66	57	15	76
Co	m + g + ss + sh/4	17.2	48	1	0.33	19
Cr	sh	84	170	4.1	35	90
Cs*	m + g + sh/3	4	1	5		5
Cu	m + g + sh/3	24.1	72	12	10	42
Eu*	g	1.6	0.8	.5		1
Fe	g + ss + sh/3	2.52%	8.56%	1.42%	0.98%	4.7%
Hf*	high	13	2	4		6
Hg	g	0.047	0.1	0.04	0.03	0.03
La	g + sh/2	46	17	55	7	39
Lu*	sh	0.7	0.6	1.1		0.7
Mn	g + sh/2	637.1	1500	390	x0	850
Na*	g + sh/2	1.51%	1.9%	2.8%		0.66%
Nd*	g	36	20	35		23
Ni	g + sh/2	39.2	130	4.5	2	68
Pb	g + sh/2	21.4	4	18	10	25
Rb	ss + sh/2	87	32	276	40	143
Sb	g + ss + sh/3	1.0	0.1	.2	1	1.5
Sc*	sh	12.2	38			10
Sm*	m + g + sh/3	7.1	5.3	.4		6.5
Sn	m + ss/2	1.0	1.5	3.0	0.6	6
Ta	?	1.1	0.48	3.5		3.5
Tb*	m + g + sh/3	1.0	0.8	1.5		0.9
Th	g + ss + sh/3	14.2	2.7	20	5.5	12
U	high	4.8	0.53	3.9	1.7	3.7
Yb*	g	4.2	2.1	3.8		3
Zn	g	50.2	94	51	40	100
Zr	high	300	140	175	220	160

Note: Data from Rose *et al.* (1979), except for that marked *, which is from Krauskopf (1967)
g – granitic; **m** – mafic; **sh** – shale; **ss** – sandstone
x – order of magnitude

geochemical population (Table 4). The exceptions are Br, Cs, Rb, Ta, Th, U, and the rare earth elements, all lithophile elements, which tend to be more abundant in the ablation till, but not consistently so.

The comparison between loose basal meltout till at site D 17M and dense basal lodgement till at site D 17B indicates that these two material types have essentially the same geochemical signature. At the stratigraphic section at site FC 22, no significant difference among basal till samples (22Bt, 22Bm and 22Bb, from top to bottom, respectively) is evident though the overlying ablation till (22A) varies somewhat, particularly for some of the exceptional elements noted above.

Anomalous values (i.e., exceeding the threshold value of the mean plus two standard deviations, calculated with extreme anomalous values deleted) occur for each analysed element, with the exception of Ag. For chalcophile and siderophile elements, generally 2 to 4 sites have values at 2 to 3 standard deviations above the mean. The exceptions are Sn, for which the results are questionable (since the values reported for the standards are not consistent with expected values, as noted above), and for Hg, which exhibits an impressive 334 ppb value at site J 15. Of possible interest is an area of detectable Au to the north of Pirate Lake. Sites F 15 and G 15 have Au values of two and three standard deviations above the mean, respectively, while several adjacent sites have values exceeding the mean. Above average As values also occur in this area. During 1992, four follow-up samples for future analysis were collected from this area, and a fifth from the vicinity of site J 15, to evaluate whether these anomalous areas are significant.

For each lithophile element, an average of 5 sites exceed the two standard deviation above the mean threshold. Commonly, one or more sites have values exceeding 4 standard deviations above the mean. Many of these anomalies occur in ablation till from the deposits along the LaCoote streams (sites L 14A, M 15A and M 16A), to the south of Bolton Lake (sites H 19A and J 18A), and to the north of Tuttle Lake (sites L 18A and L 19A). An exception is site J 14, which is a very sandy, very granitic basal till. The anomalies at these sites may relate more to the high granite content of the material than to the presence of significant mineralization.

GLACIAL HISTORY

Southwestern New Brunswick has been affected by ice flow in many different directions (Seaman 1991; Seaman *et al.* 1991). Evidence for a number of these directions is present in the

Table 4. Comparison Between Geochemical Values of Basal and Ablation Tills,

Table 4. Comparison Between Geochemical Values of Basal and Ablation Tills, Forest City (21 G/12)

Element	Lab	Maximum		Minimum		Average	
		Ablation	Basal	Ablation	Basal	Ablation	Basal
Ag (ppm)	DNRE	1	1	0.3	0.3	0.7	0.6
As (ppm)	A-L	21	22	1.7	4.1	11	10
	B-C	19	21	2.0	2.9	11	10
Au (ppb)	A-L	9	9	<2	<2	2	2
	B-C	10	4	<2	<2	2	1
Ba (ppm)	A-L	490	860	320	280	420	420
	B-C	430	500	140	220	310	340
Br (ppm)	A-L	36	73	<0.5	<0.5	11	6.8
	B-C	35	65	1.3	<0.5	12	6.9
Cd (ppm)	B-C	0.5	0.7	<0.2	<0.2	0.2	0.2
Ce (ppm)	A-L	190	170	90	72	120	99
	B-C	170	140	76	52	110	85
Co (ppm)	A-L	16	19	7	8	12	11
	B-C	19	22	7	7	14	14
	DNRE	24.8	26.0	9.2	10.0	15.8	17.5
Cr (ppm)	A-L	110	120	47	51	77	86
	B-C	130	130	56	61	89	93
Cs (ppm)	A-L	18	9	2	2	7	4
	B-C	23	13	2.5	2.2	10	6.0
Cu (ppm)	DNRE	44.7	40.7	9.5	10.0	26.0	23.7
Eu (ppm)	A-L	3 2	2.2	1.2	1.0	1.7	1.5
	B-C	2	2	<1	<1	1	1
Fe (%)	A-L	4.03	4.77	1.86	1.91	3.07	3.16
	B-C	4.3	4.3	1.7	1.8	3.12	3.10
	DNRE	3.43	3.26	1.44	1.66	2.39	2.54
Hf (ppm)	A-L	25	19	9	8	15	12
	B-C	20	13	6	4	11	9
Hg (ppb)	B-C	90	334	26	16	50	46
La (ppm)	A-L	78	76	29	32	53	44
	B-C	69	58	32	30	46	40
Lu (ppm)	A-L	1.66	1.29	0.58	0.44	0.88	0.67
	B-C	6.5	2.5	0.4	0.3	1.6	0.8
Mn (ppm)	DNRE	1214.1	1472.5	119.8	182.5	625.4	641.6
Mo (ppm)	A-L	<1	3	<1	<1	.	.
	B-C	3	4	<1	<1	.	.
Na (%)	A-L	2.28	1.83	1.31	1.12	1.67	1.47
	B-C	2.0	1.7	1.1	0.91	1.48	1.32
Nd (ppm)	A-L	69	56	24	25	41	34
Ni (ppm)	A-L	110	120	<20	<20	.	.
	B-C	58	69	<10	<10	.	33
Pb (ppm)	DNRE	57.7	55.6	20.7	27.4	34.7	40.2
	DNRE	29.4	29.4	11.2	11.4	21.7	21.4

Table 4 concluded

Element	Lab	Maximum		Minimum		Average	
		Ablation	Basal	Ablation	Basal	Ablation	Basal
Rb (ppm)	A-L	160	140	56	42	104	84
	B-C	190	160	46	35	106	79
Sb (ppm)	A-L	1.8	1.5	0.6	0.5	1.0	0.9
	B-C	1.2	1.5	0.5	0.4	0.8	0.9
Sc (ppm)	A-L	17	18	7.7	9.2	12	12
	B-C	16	16	6.1	8.3	11	11
Sm (ppm)	A-L	17	13	4.5	4.3	8.8	6.8
	B-C	18.2	11.8	5.8	4.6	9.5	7.5
Sn (ppm)	A-L	2	4	<1	<1	1	1
Ta (ppm)	A-L	2.5	2.9	<0.5	<0.5	1.4	1.0
	B-C	3.7	2.6	0.9	0.9	1.9	1.3
Tb (ppm)	A-L	2.0	2.0	<0.5	<0.5	1.1	1.0
	B-C	2.9	1.9	0.9	0.7	1.5	1.1
Th (ppm)	A-L	31	26	10	9.1	19	13
	B-C	25.1	18	9.0	7.7	16	11
U (ppm)	A-L	43	13	3.1	1.8	7.7	4.2
	B-C	47.3	16	2.8	2.2	9.0	4.6
W (ppm)	A-L	5	7	<1	<1	-	-
	B-C	5	4	<1	<1	2	1
Yb (ppm)	A-L	10.7	8.0	3.0	2.5	5.3	3.9
	B-C	8	7	3	<2	5	3
Zn (ppm)	A-L	117	242	<50	<50	69	82
	DNRE	63.5	84	31.2	30.8	51.2	50.0
Zr (ppm)	B-C	670	590	<200	<200	340	290
Grain Size							
Clay (%)		18	34	4	7	10	18
Silt (%)		46	43	6.5	12	20	31
Sand (%)		88	79.5	42	32	70	51
Lithology							
Sedimentary (%)		84	88	0	13	34	64
Granitic (%)		100	83	4	0	55	17
Mafic (%)		14	24	0	0	7	12
Felsic Volc. (%)		10	15	0	0	3	5
Quartz (%)		3	6	0	0	1	2

A-L – Activation Laboratories Ltd. (ACTLABS)
B-C – Bonder-Clegg & Company Ltd.
DNRE – N.B. Dept. of Natural Resources and Energy

Forest City area. Glacial striae record ice flow directions ranging from 090° to 224°. However, the statistically dominant ice-flow direction is southeastward (toward 139°), parallel to the glacially streamlined bedrock ridges and drumlinoid ridges of the area. These features were probably formed during an early phase of glaciation (Seaman *et al.* 1992), that may possibly be the equivalent of the Caledonia phase of Rampton *et al.* (1984), and not by the last major flow, as previously thought by Seaman (1982). If the chronology of Seaman *et al.* (1991) is correct, subsequent ice-flow directions shifted progressively westward until the glacier was flowing toward the southwest, and then reverted to southeastward flow (~130°) followed by progressive shifts to more eastward flow.

Only two sites exhibiting cross-cutting erosional relationships have been observed in the Forest City area. About 500 m to the southeast of Parker Lake, grooves trending toward 139° are cross-cut by later striae trending toward 131°, while at the northwest end of East Brook Ridge a large groove exploiting a bedrock joint and trending toward 169° appears to be cross-cut by striae trending toward 160°. The former cross-cutting relationship accords with the chonology of Seaman *et al.* (1991). However, the latter is problematic, since Seaman *et al.* (1991) identified an early 165° flow direction, plus later 160° and 171° flow directions occurring in unknown order, and it cannot be determined whether the 169° groove relates to the 165° or the 171° event.

Statistical analysis of a till fabric measurement for site FC 22, the borrow pit to the southeast of site E 19, reveals a principal eigenvector plunging 15.6° toward 267°, while a mirror image plot of the till fabric suggests a trend toward 118°. This fabric can be interpreted as indicating approximately eastward ice flow if the fabric is parallel, or approximately north–south ice-flow if the fabric is transverse. However, given the problems associated with till fabric data obtained from other parts of southwestern New Brunswick (Seaman 1991), no great faith is placed in the validity of this till fabric as an indicator of ice-flow direction during till deposition.

Seaman *et al.* (1991) suggest that deglaciation of southwestern New Brunswick occurred as a result of regional stagnation of the glacier, with the formation of an extensive subglacial dendritic drainage network, followed by disintegration into remnant ice massed occupying topographic depressions. The minor esker systems in the Forest City area and the presence of hummocky ablation moraine in low-lying areas accord with this suggestion.

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APPENDIX A. SITE LOCATIONS AND ELEVATIONS, FOREST CITY (21 G/12)

APPENDIX A. SITE LOCATIONS AND ELEVATIONS, FOREST CITY (21 G/12)

Site	UTM (E)	UTM (N)	Elev. (m)
A 16	593950	5062875	140
B 14	596000	5066975	136
B 15	596075	5065025	140
B 16	596175	5063075	180
B 17	596050	5061050	136
B 18	596300	5059300	136
C 14A	598000	5066925	130
C 14B	597300	5066800	128
C 15	598000	5065000	142
C 16A	597975	5063000	130
C 16B	598200	5063200	130
C 17	598000	5061000	155
C 18	598000	5059000	171
D 14	600175	5067050	142
D 15	600000	5065000	153
D 16	599850	5062950	130
D 17M	599725	5061025	130
D 17B	599625	5061050	130
D 18	599600	5059650	121
D 19A	599650	5057150	130
E 14	601975	5066925	210
E 15	602200	5065150	148
E 16	602025	5063000	131
E 17	601825	5061025	133
E 18	601950	5058950	133
E 19	601950	5057025	185
E 20	602525	5055375	130
F 14A	604000	5067000	183
F 14B	603375	5067025	180
F 15	604000	5065000	183
F 16	603975	5062950	191
F 17	604000	5061000	179
F 18	603950	5098925	130
F 19	604000	5057000	147
F 20	604275	5055250	130
F 21	604075	5053450	130
G 14	606100	5067050	237
G 15	606050	5065025	260
G 16	606225	5063200	208
G 17	606000	5061000	177
G 18	605975	5059025	190
G 19	605925	5057125	166
G 20	606000	5055000	194
G 21	606050	5053375	120

Site	UTM (E)	UTM (N)	Elev. (m)
H 14A	608000	5067025	205
H 15	607975	5065000	210
H 16	608000	5063000	205
H 17	608025	5061000	225
H 18	608000	5059000	190
H 19A	607825	5057000	200
H 20	607950	5054950	200
H 21	608000	5053000	137
J 14	610075	5067050	199
J 15	610050	5065050	187
J 16	610050	5063000	173
J 17	609400	5061025	185
J 18A	610000	5059000	183
J 18B	610500	5058925	198
J 19	610050	5057000	140
J 20	610000	5055000	170
J 21	610000	5053000	140
J 22	610275	5051550	120
K 14	612050	5067000	210
K 15	611725	5064900	225
K 16	611925	5063000	197
K 17A	612150	5061050	172
K 17B	612400	5061325	189
K 18	612000	5059050	193
K 19A	612000	5057000	152
K 19B	611975	5056350	178
K 20	612200	5055075	164
K 21	612000	5053325	120
K 22	612550	5051025	123
L 14A	614000	5067000	160
L 15	613900	5065000	183
L 16	613975	5063000	161
L 17	614000	5061000	159
L 18A	614000	5059000	145
L 18B	614425	5059350	185
L 19A	614050	5057050	142
L 19B	614525	5057175	180
L 20	613800	5055050	160
L 21	614000	5053000	132
L 22	614100	5051250	118
M 14A	616000	5067000	185
M 14B	616375	5067225	250
M 15A	615800	5065000	152
M 16A	616050	5063000	135
M 17A	616000	5061000	183
M 17B	615625	5060925	188
M 18	616300	5059150	136
M 19L	616000	5057200	120
M 20	616000	5055000	142
M 21	616075	5053025	130
M 22	615550	5051050	121

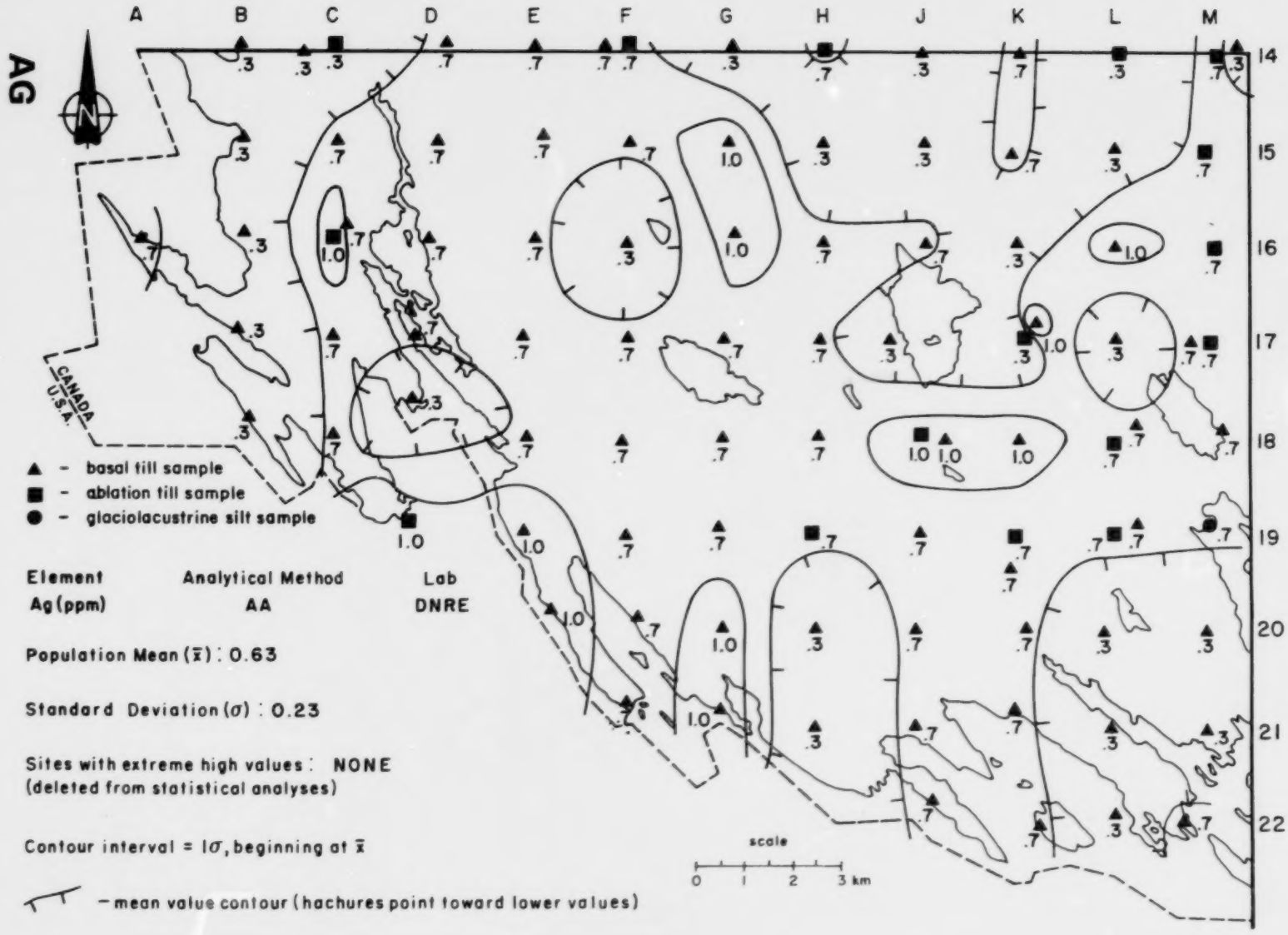
APPENDIX B. CONTOURED ELEMENT-DISTRIBUTION MAPS,

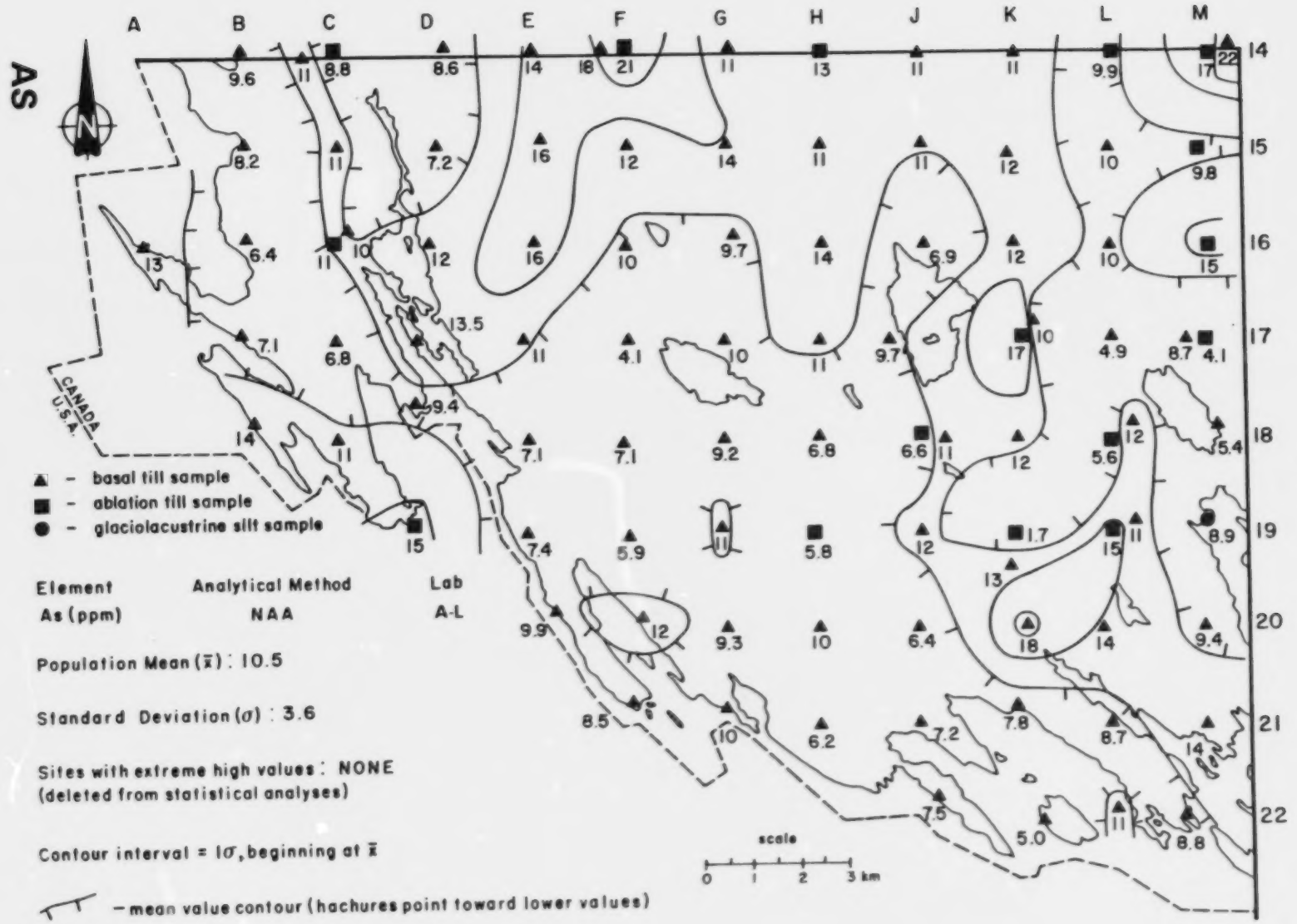
FOREST CITY (21 G/12)

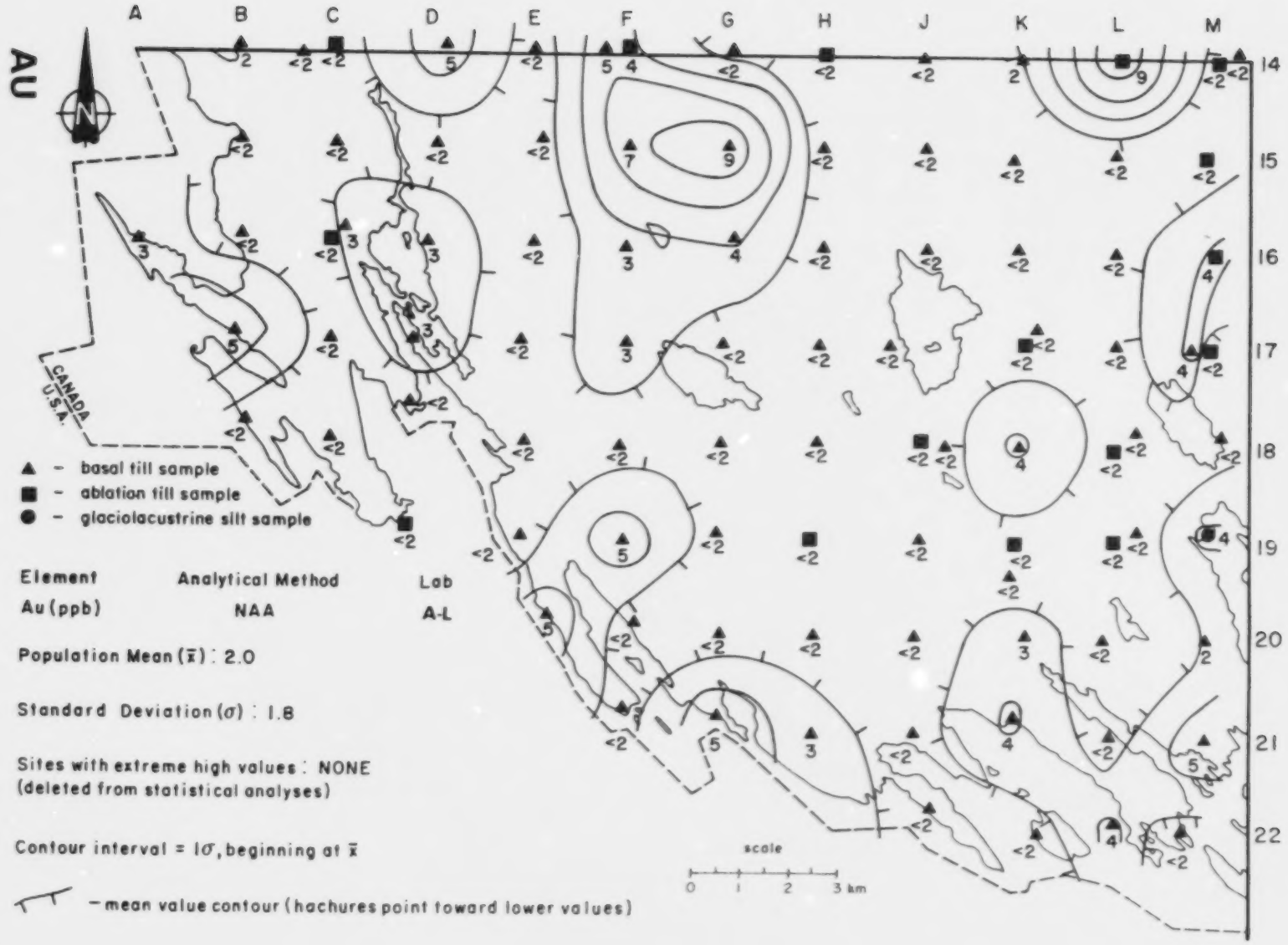
Element	Page	Element	Page
Ag	31	Mn	48
As	32	Na	49
Au	33	Nd	50
Ba	34	Ni	51
Br	35	Pb	52
Cd	36	Rb	53
Ce	37	Sb	54
Co	38	Sc	55
Cr	39	Sm	56
Cs	40	Sn	57
Cu	41	Ta	58
Eu	42	Tb	59
Fe	43	Th	60
Hf	44	U	61
Hg	45	Yb	62
La	46	Zn	63
Lu	47	Zr	64

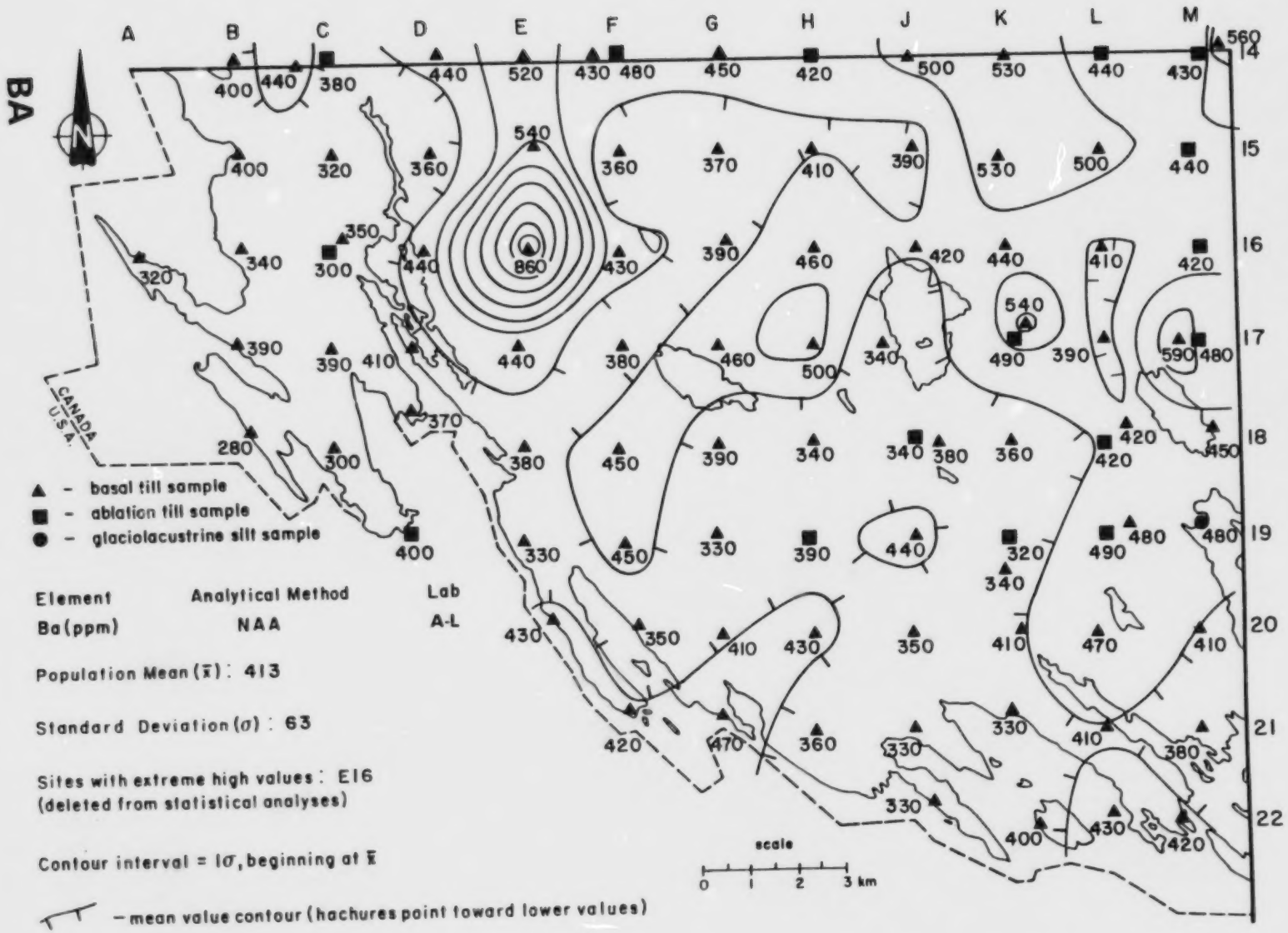
A-L - Activation Laboratories Ltd. (ACTLABS)

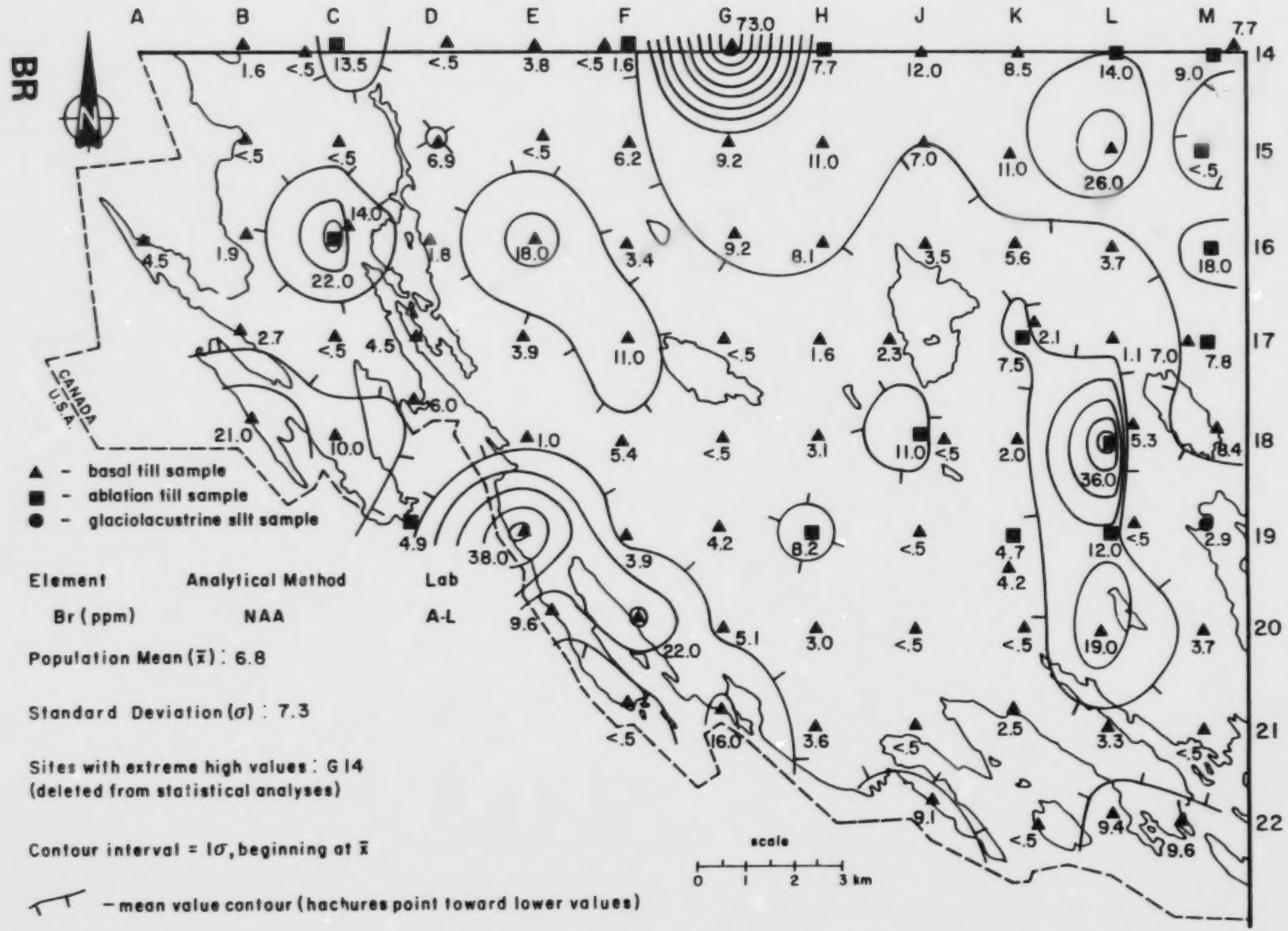
B-C - Bondar-Clegg & Company Ltd.

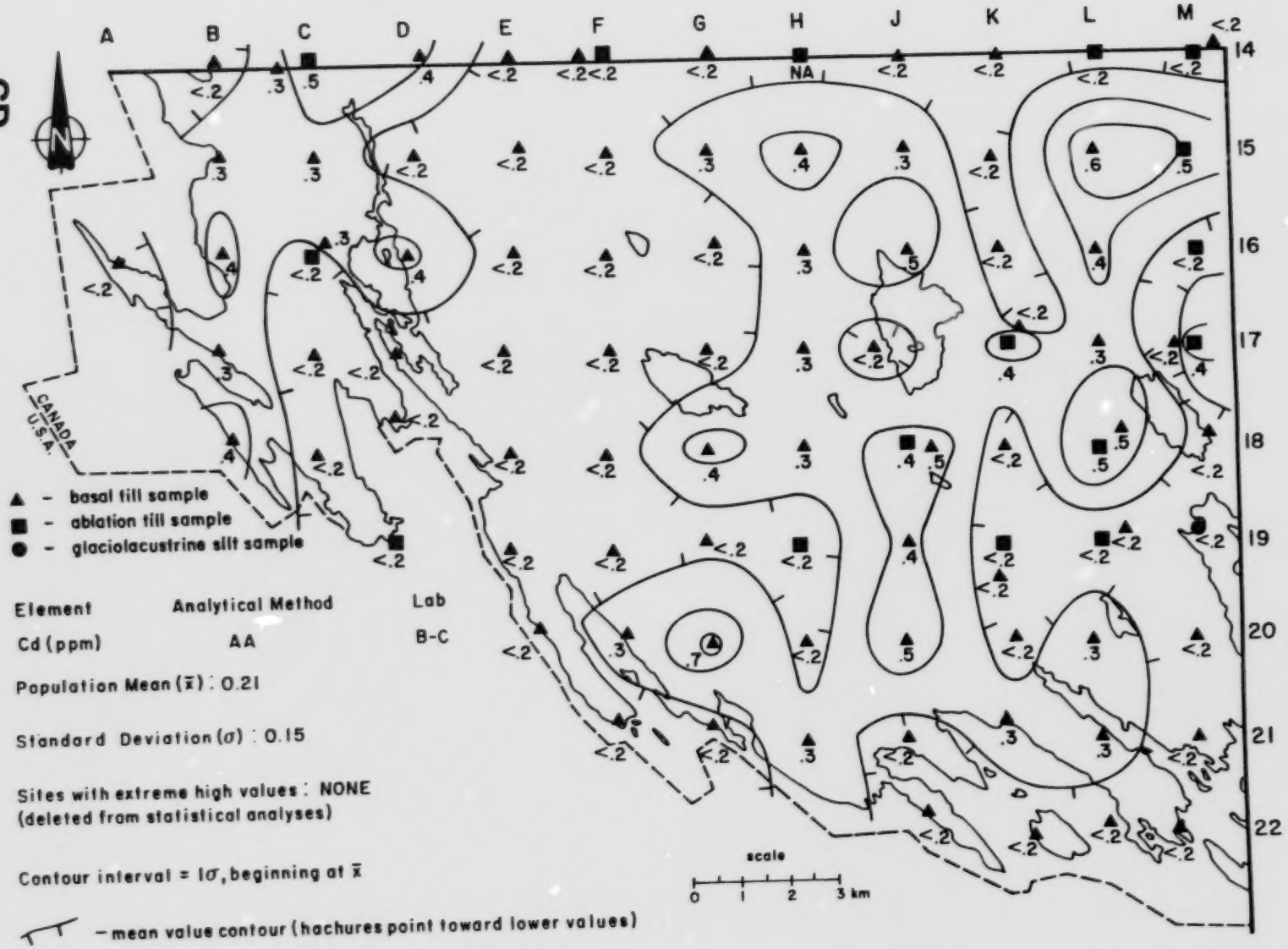

AG
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
N
CANADA
U.S.A.
▲ - basal till sample
■ - ablation till sample
● - glaciolacustrine silt sample
Element Analytical Method Lab
Ag (ppm) AA DNRE
Population Mean ($\bar{x}$) : 0.63
Standard Deviation (σ) : 0.23
Sites with extreme high values : NONE
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
- mean value contour (hachures point toward lower values)
scale
0 1 2 3 km

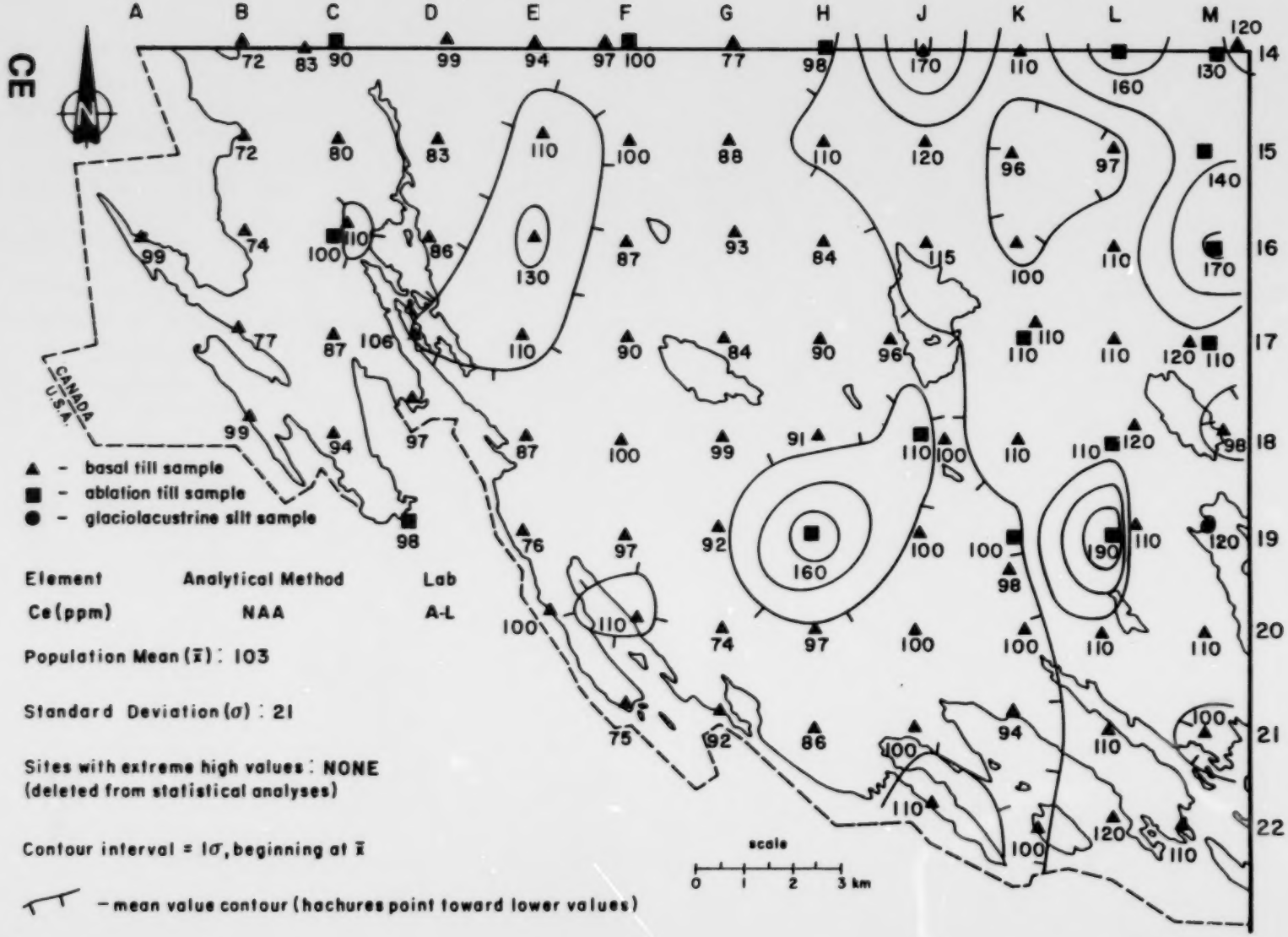

AS
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
CANADA
U.S.A.
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element Analytical Method Lab
As (ppm) NAA A-L
Population Mean ($\bar{x}$) : 10.5
Standard Deviation (σ) : 3.6
Sites with extreme high values : NONE
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km


AU
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
N
CANADA
U.S.A.
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element Analytical Method Lab
Au (ppb) NAA A-L
Population Mean ($\bar{x}$) : 2.0
Standard Deviation (σ) : 1.8
Sites with extreme high values : NONE
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km

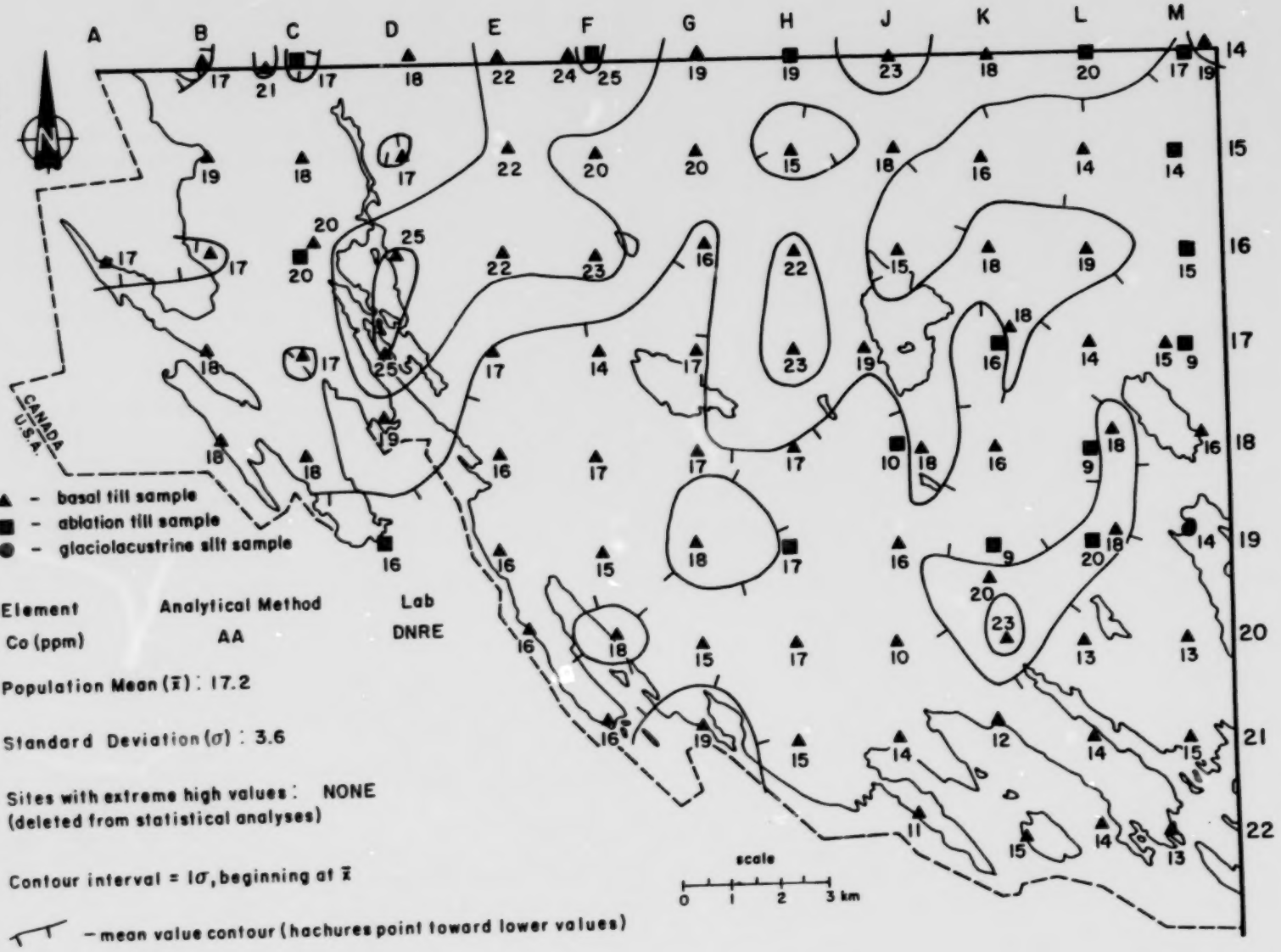

BA
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
N
CANADA
U.S.A.
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element Analytical Method Lab
Ba(ppm) NAA A-L
Population Mean ($\bar{x}$): 413
Standard Deviation (σ): 63
Sites with extreme high values: E16
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km

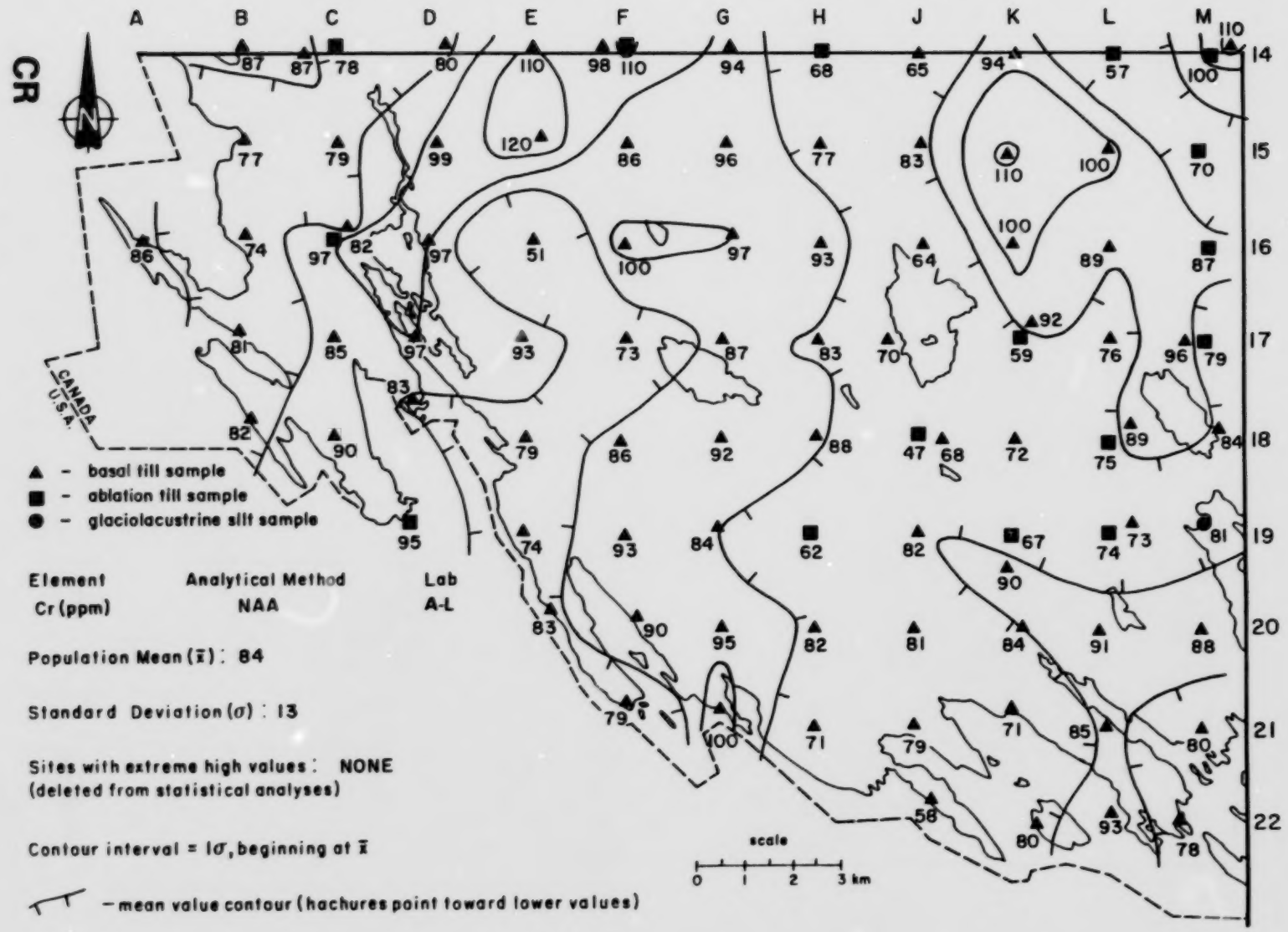

BR
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
CANADA
U.S.A.
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element Analytical Method Lab
Br (ppm) NAA A-L
Population Mean ($\bar{x}$) : 6.8
Standard Deviation (σ) : 7.3
Sites with extreme high values : G 14
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km

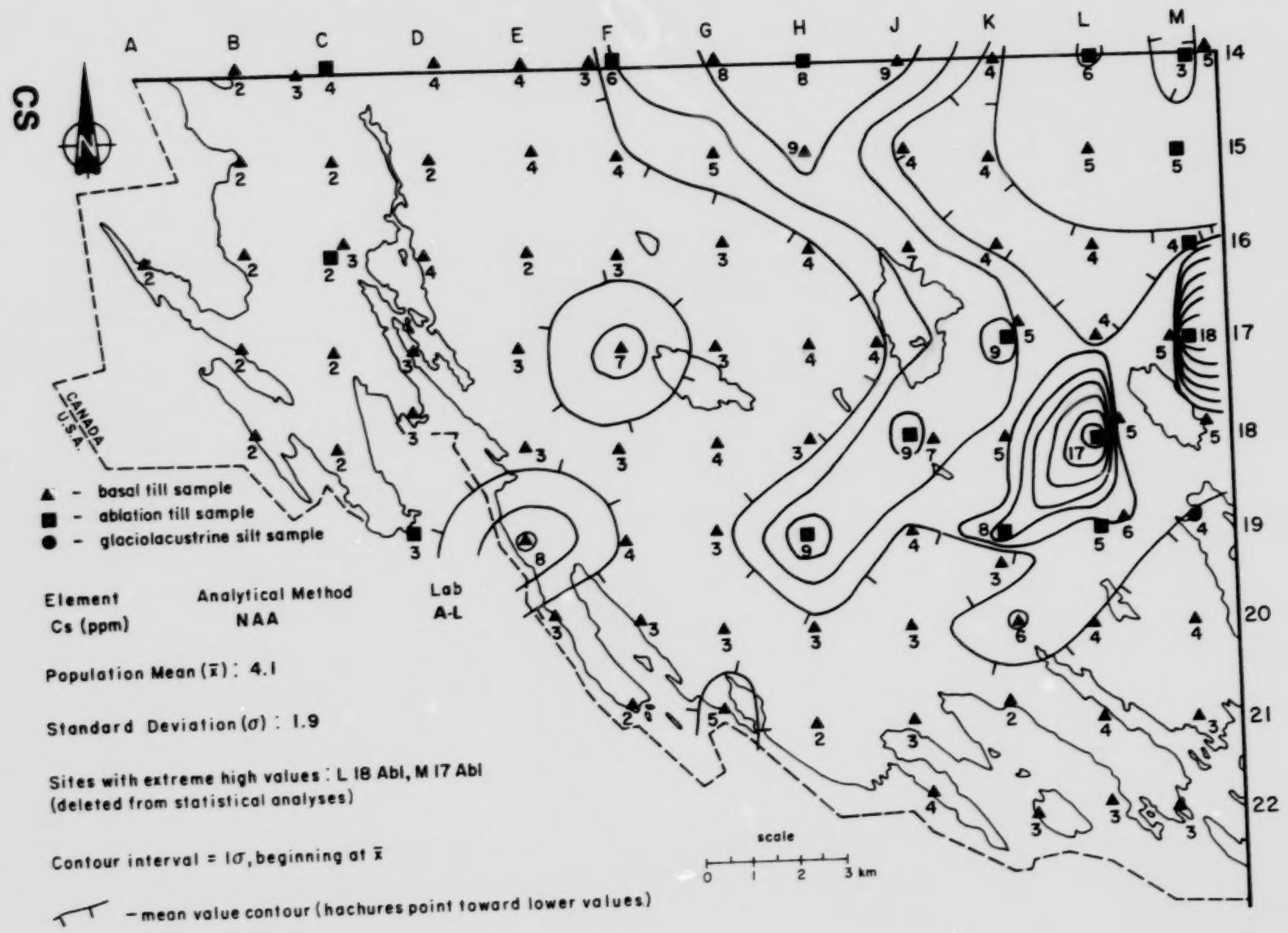

CD
A
B
C
D
E
F
G
H
J
K
L
M
14
15
16
17
18
19
20
21
22
CANADA
U.S.A.
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element
Analytical Method
Lab
Cd (ppm)
AA
B-C
Population Mean ($\bar{x}$) : 0.21
Standard Deviation (σ) : 0.15
Sites with extreme high values : NONE
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km

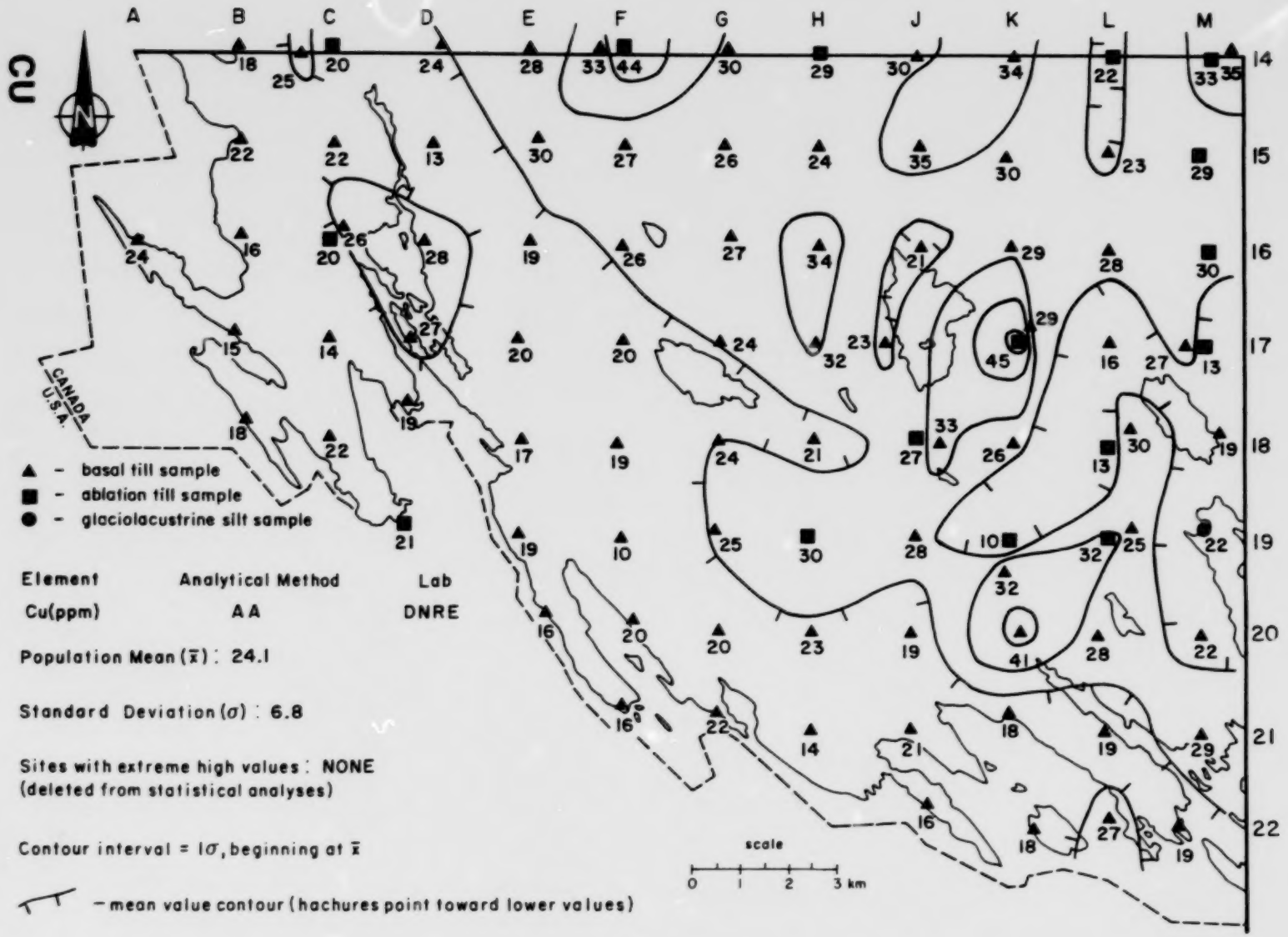

CE
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
CANADA
U.S.A.
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element Analytical Method Lab
Ce(ppm) NAA A-L
Population Mean ($\bar{x}$) : 103
Standard Deviation (σ) : 21
Sites with extreme high values : NONE
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km

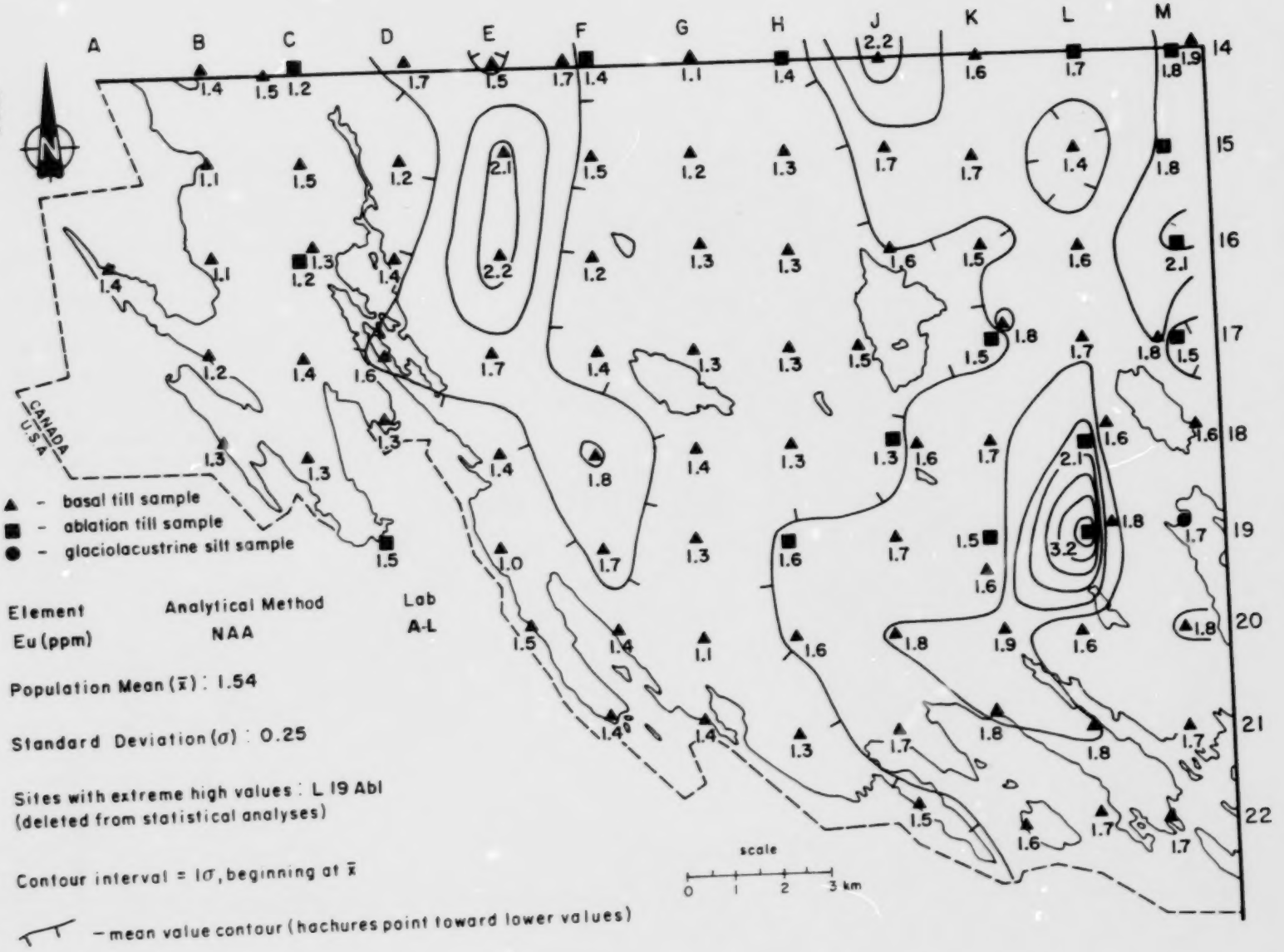
Co

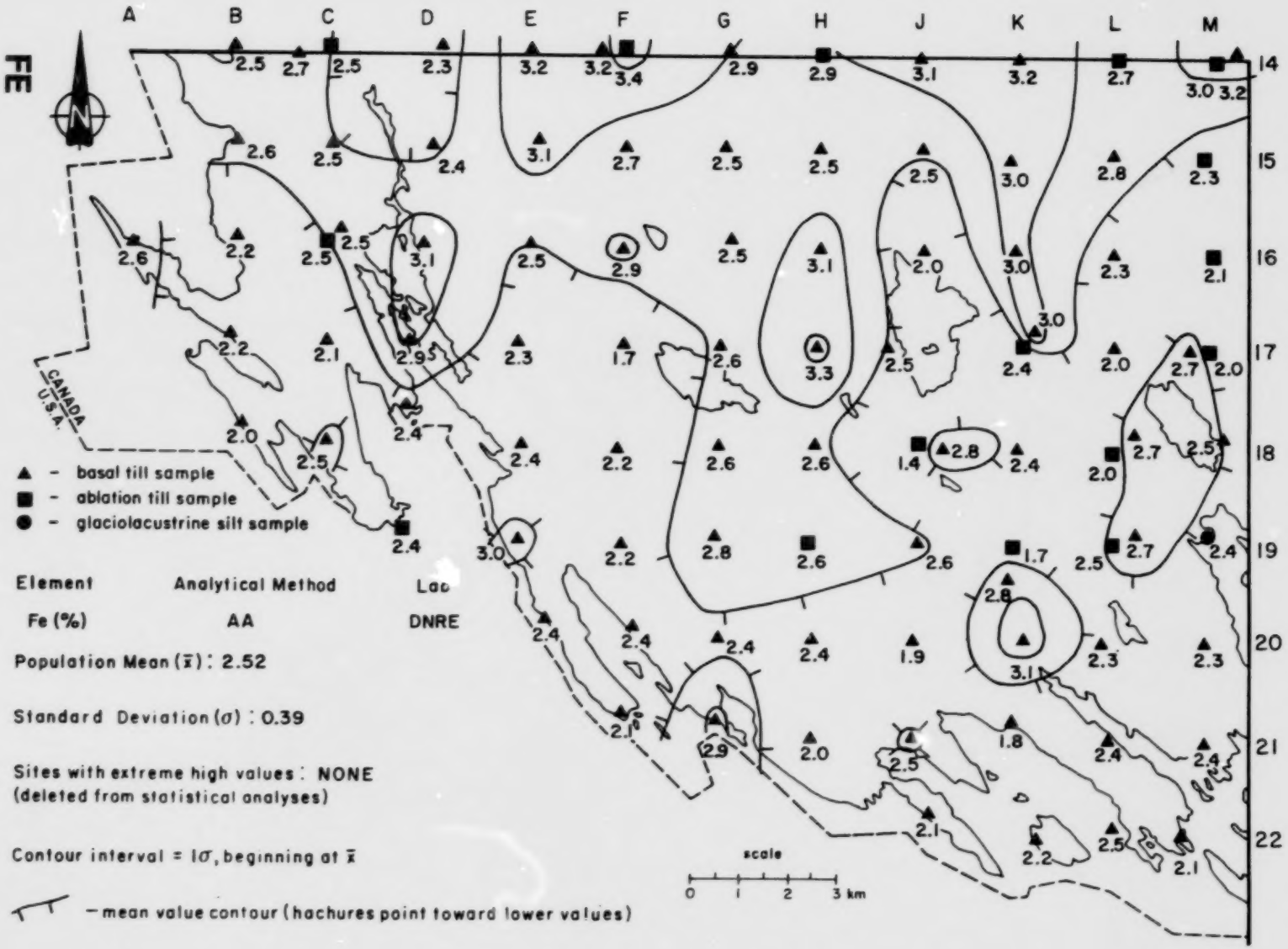

A
B
C
D
E
F
G
H
J
K
L
M
14
15
16
17
18
19
20
21
22
N
CANADA
U.S.A.
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element
Analytical Method
Lab
Co (ppm)
AA
DNRE
Population Mean ($\bar{x}$) : 17.2
Standard Deviation (σ) : 3.6
Sites with extreme high values : NONE
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km

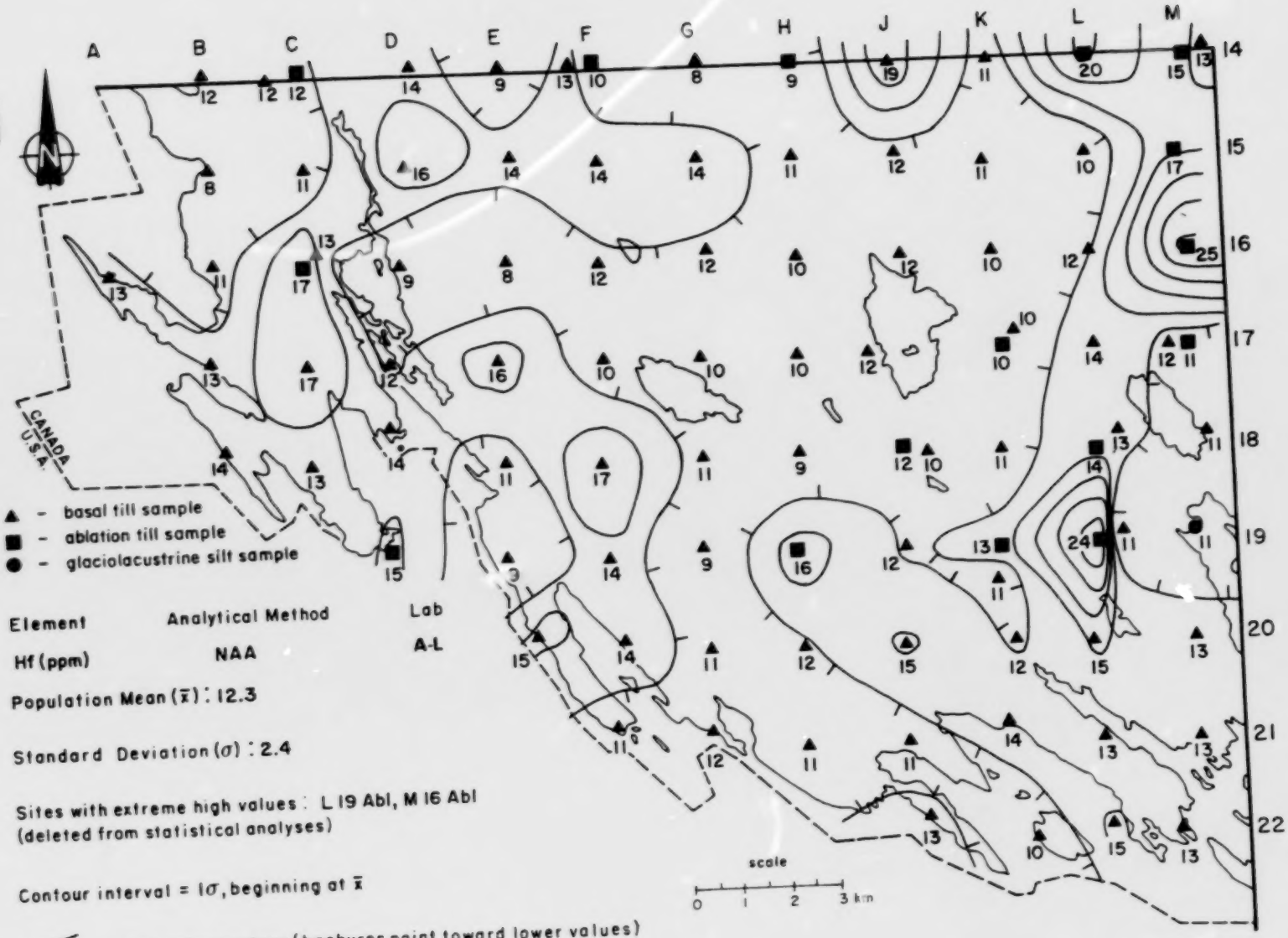

CR
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
CANADA
U.S.A.
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element Analytical Method Lab
Cr (ppm) NAA A-L
Population Mean ($\bar{x}$): 84
Standard Deviation (σ): 13
Sites with extreme high values: NONE
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km

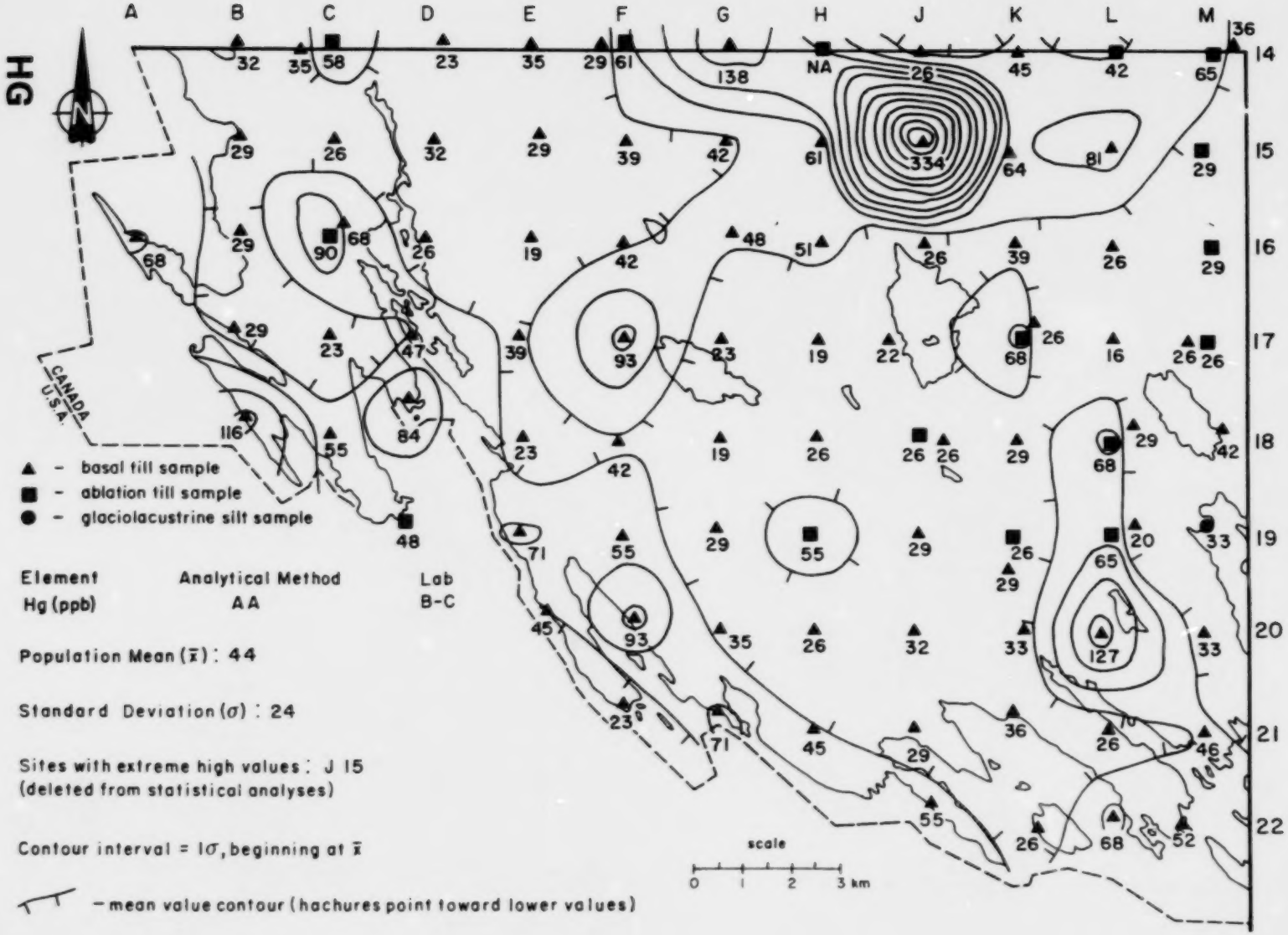

CS
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
CANADA
U.S.A.
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element
Cs (ppm)
Analytical Method
NAA
Lab
A-L
Population Mean ($\bar{x}$) : 4.1
Standard Deviation (σ) : 1.9
Sites with extreme high values : L 18 Abl, M 17 Abl
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km

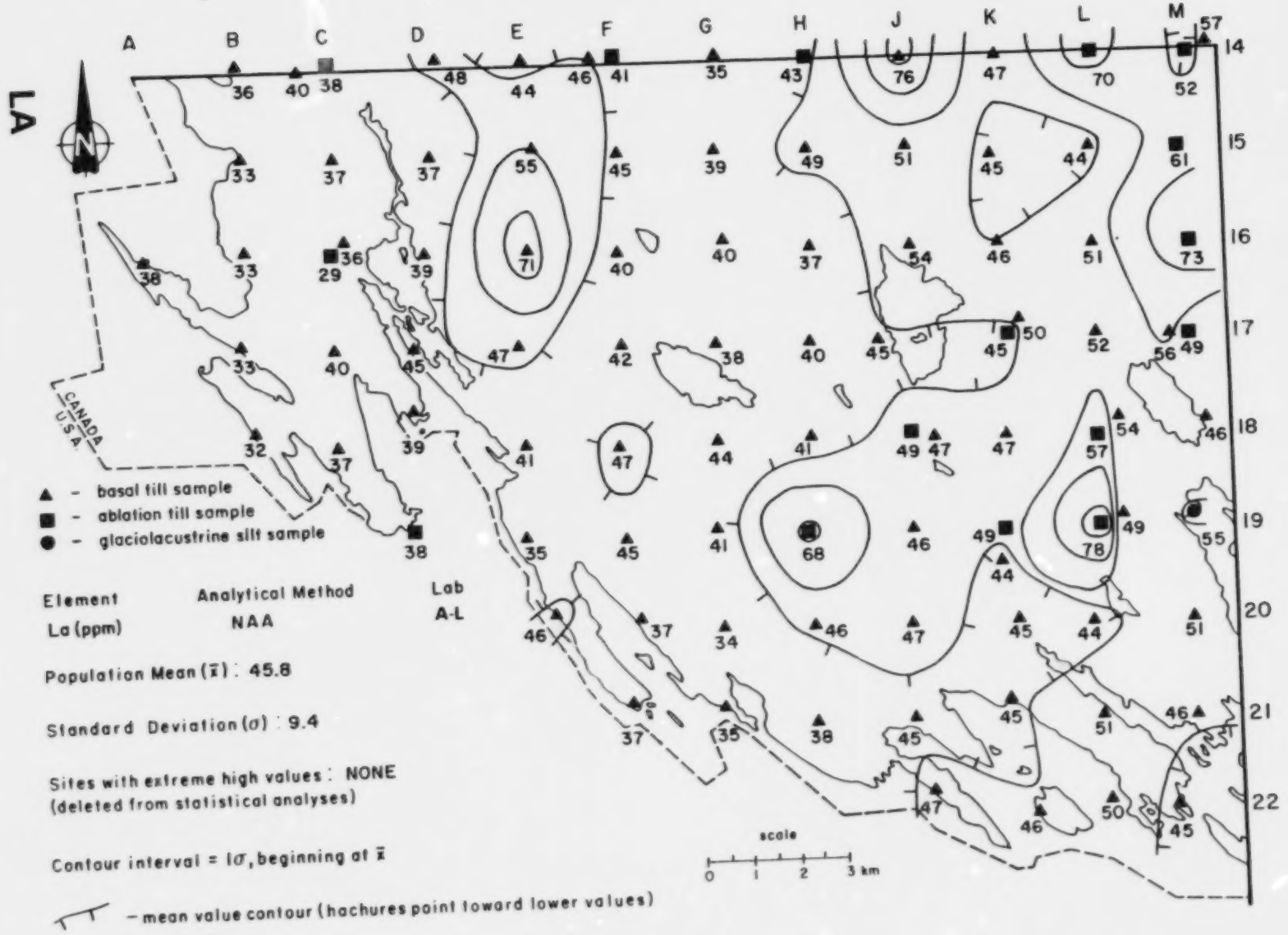

CU
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
CANADA
U.S.A.
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element Analytical Method Lab
Cu(ppm) AA DNRE
Population Mean ($\bar{x}$) : 24.1
Standard Deviation (σ) : 6.8
Sites with extreme high values : NONE
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km

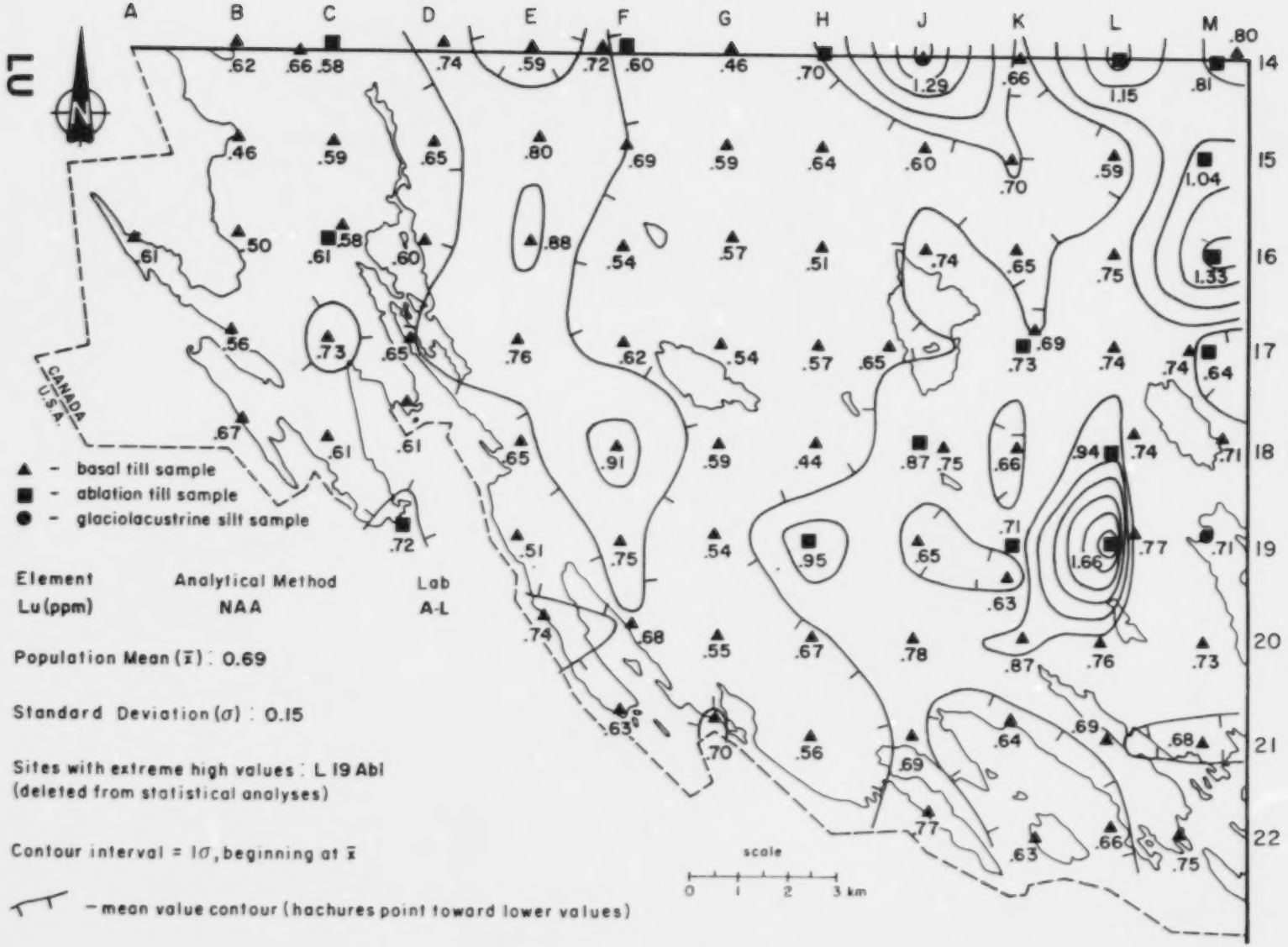

EU
A
B
C
D
E
F
G
H
J
K
L
M
14
15
16
17
18
19
20
21
22
CANADA
U.S.A.
▲ - basal till sample
■ - ablation till sample
● - glaciolacustrine silt sample
Element
Eu (ppm)
Analytical Method
NAA
Lab
A-L
Population Mean ($\bar{x}$) : 1.54
Standard Deviation (σ) : 0.25
Sites with extreme high values : L 19 Abl
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km

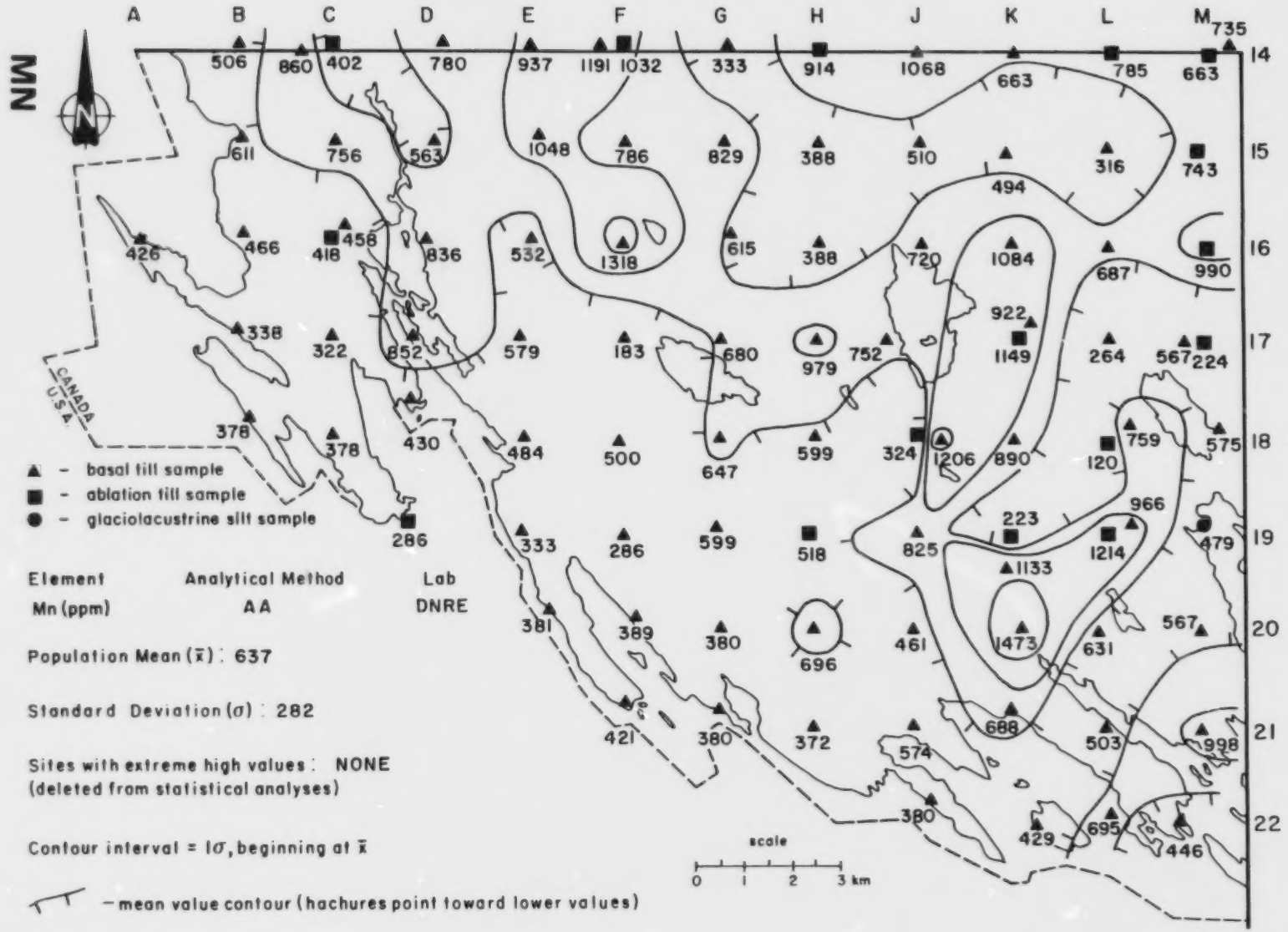

FE
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
CANADA
U.S.A.
▲ - basal till sample
■ - ablation till sample
● - glaciolacustrine silt sample
Element Analytical Method Lab
Fe (%) AA DNRE
Population Mean ($\bar{x}$): 2.52
Standard Deviation (σ): 0.39
Sites with extreme high values: NONE
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km

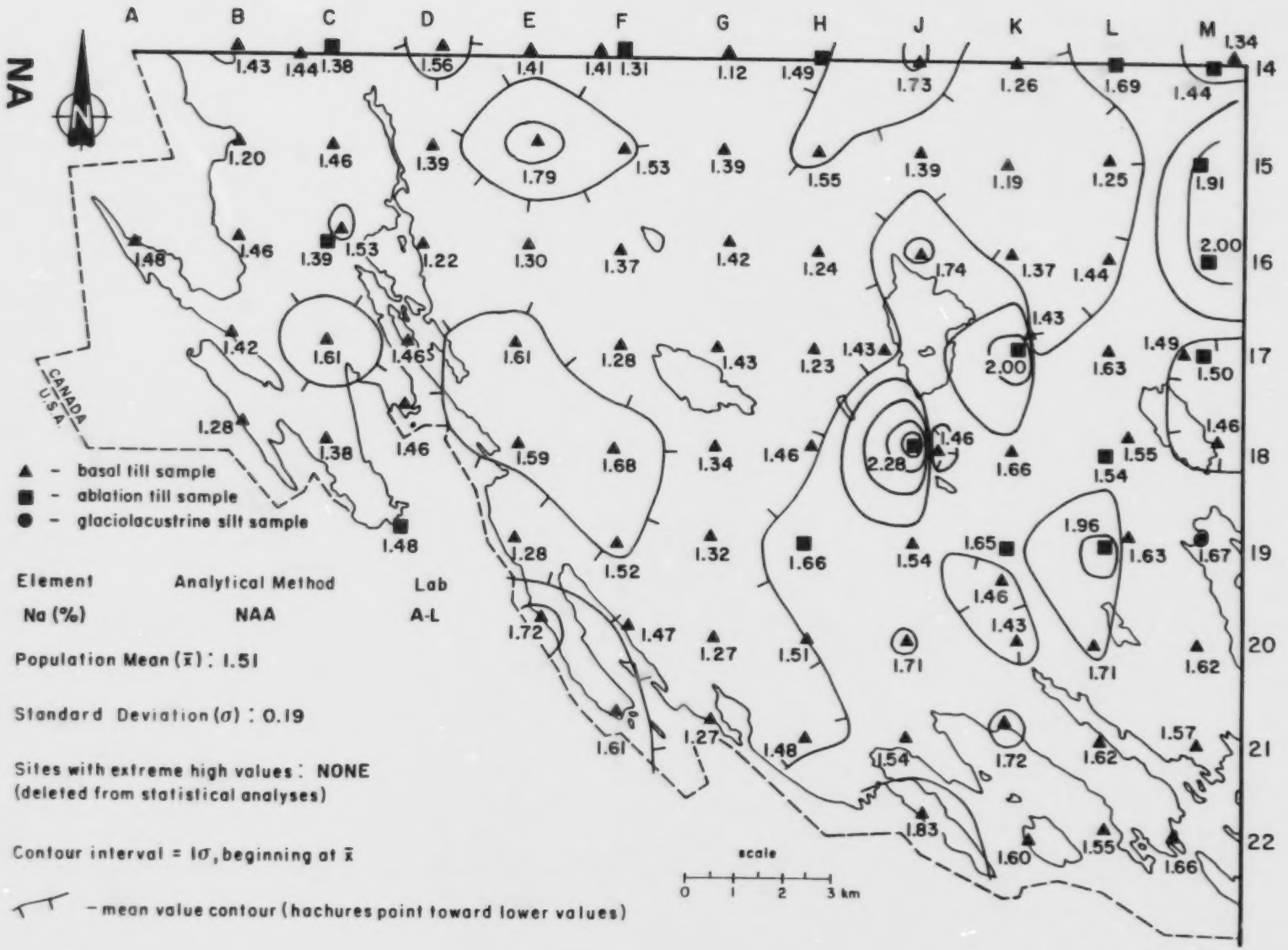

Hf
A B C D E F G H J K L M
CANADA
U.S.A.
▲ - basal till sample
■ - ablation till sample
● - glaciolacustrine silt sample
Element Analytical Method Lab
Hf (ppm) NAA A-L
Population Mean ($\bar{x}$) : 12.3
Standard Deviation (σ) : 2.4
Sites with extreme high values : L 19 Abl, M 16 Abl
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km

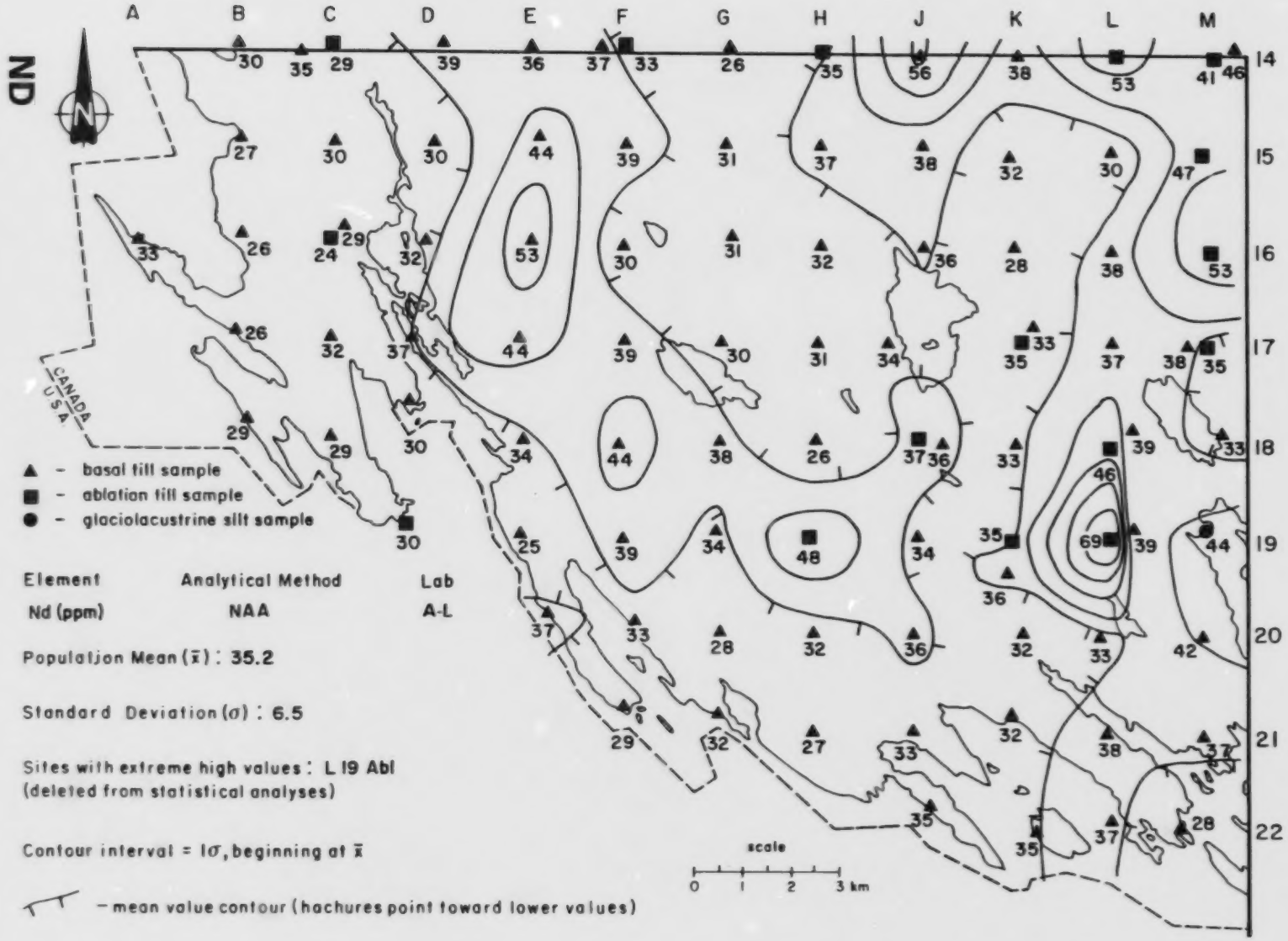

HG
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
CANADA
U.S.A.
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element Analytical Method Lab
Hg (ppb) AA B-C
Population Mean ($\bar{x}$) : 44
Standard Deviation (σ) : 24
Sites with extreme high values : J 15
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km

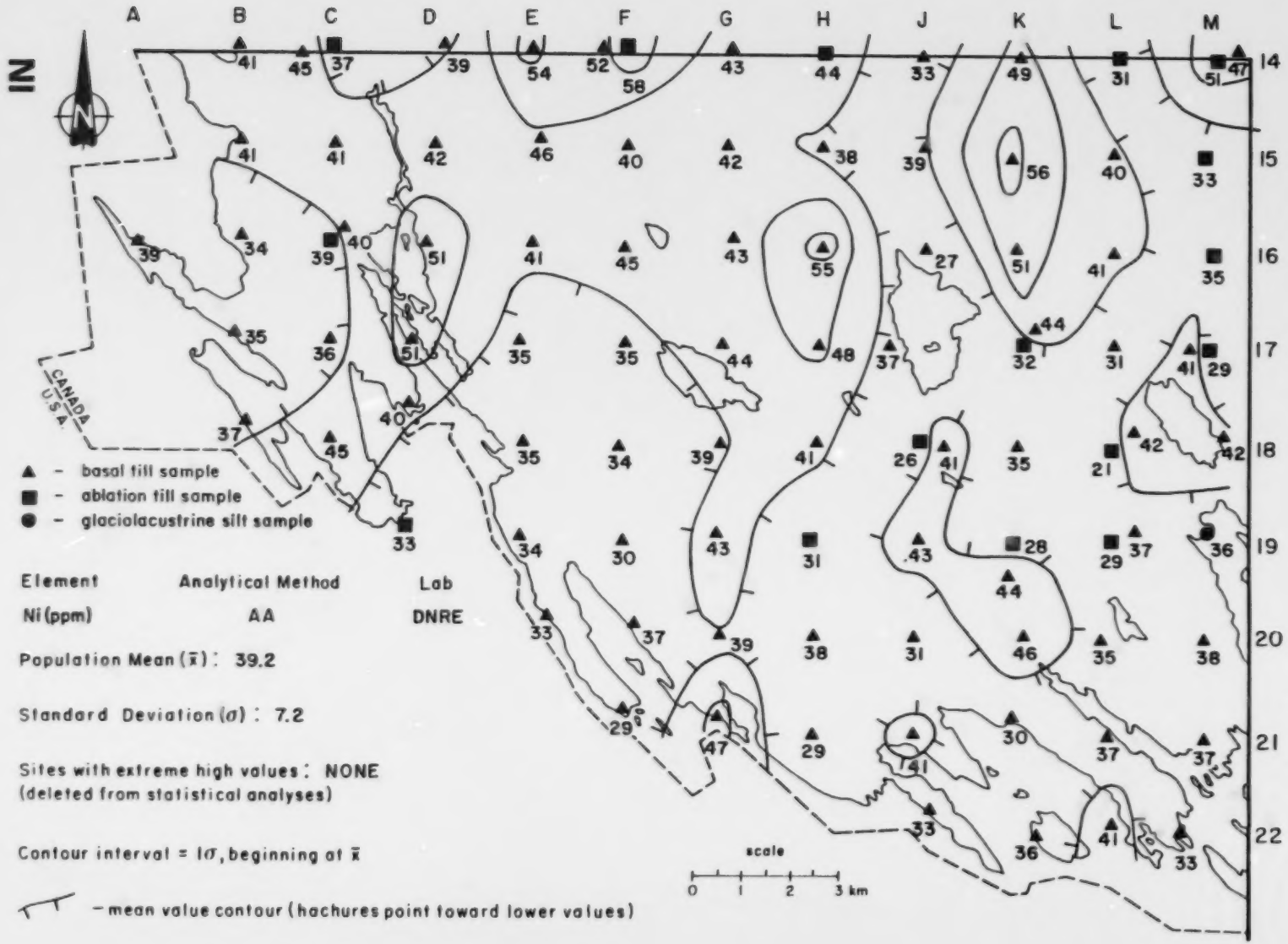

LA
A
B
C
D
E
F
G
H
J
K
L
M
14
15
16
17
18
19
20
21
22
CANADA
U.S.A.
▲ - basal till sample
■ - ablation till sample
● - glaciolacustrine silt sample
Element
La (ppm)
Analytical Method
NAA
Lab
A-L
Population Mean ($\bar{x}$) : 45.8
Standard Deviation (σ) : 9.4
Sites with extreme high values : NONE
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km

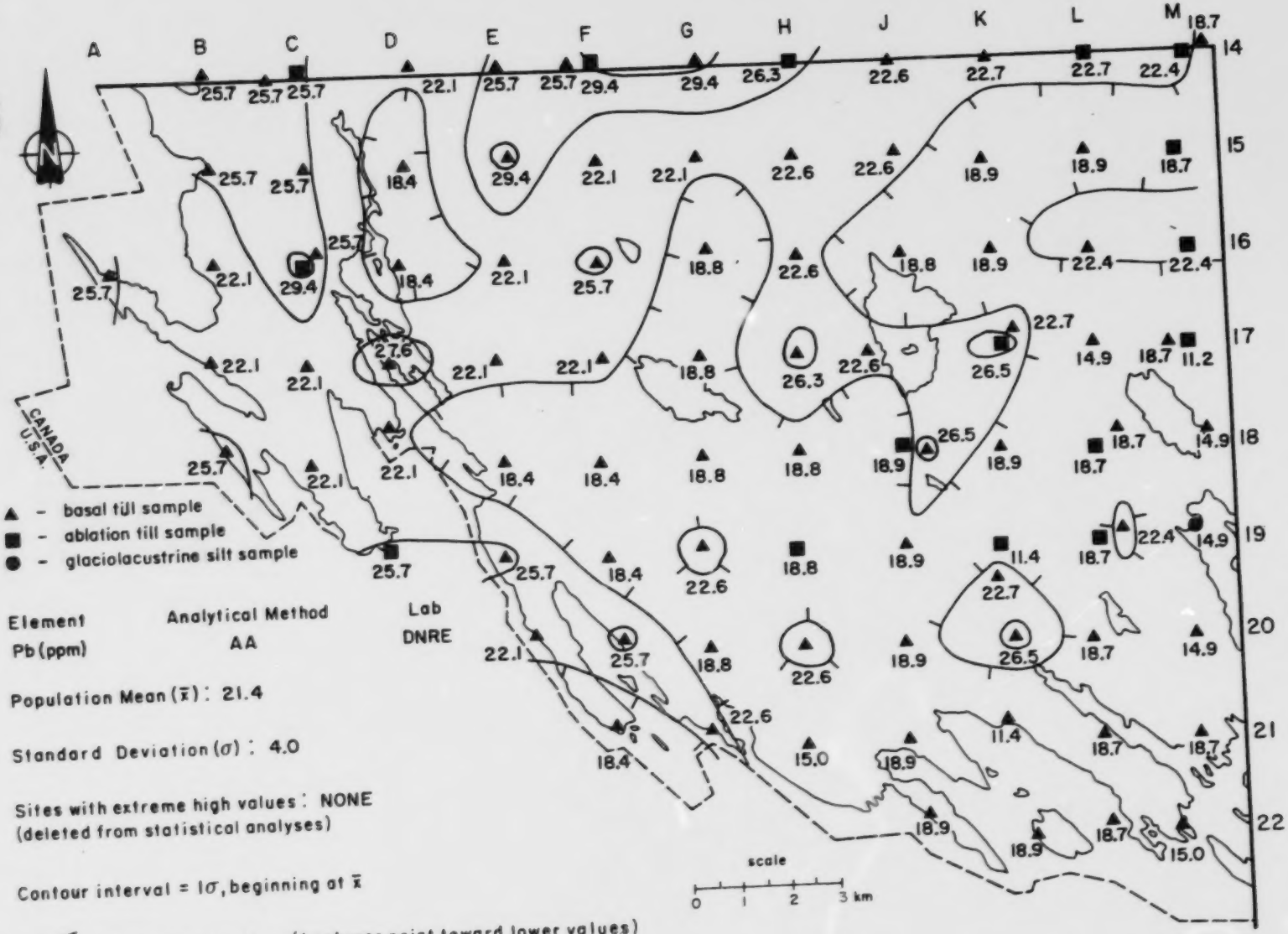

LU
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
CANADA
U.S.A.
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element Analytical Method Lab
Lu(ppm) NAA A-L
Population Mean ($\bar{x}$) : 0.69
Standard Deviation (σ) : 0.15
Sites with extreme high values : L 19 Abl
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km

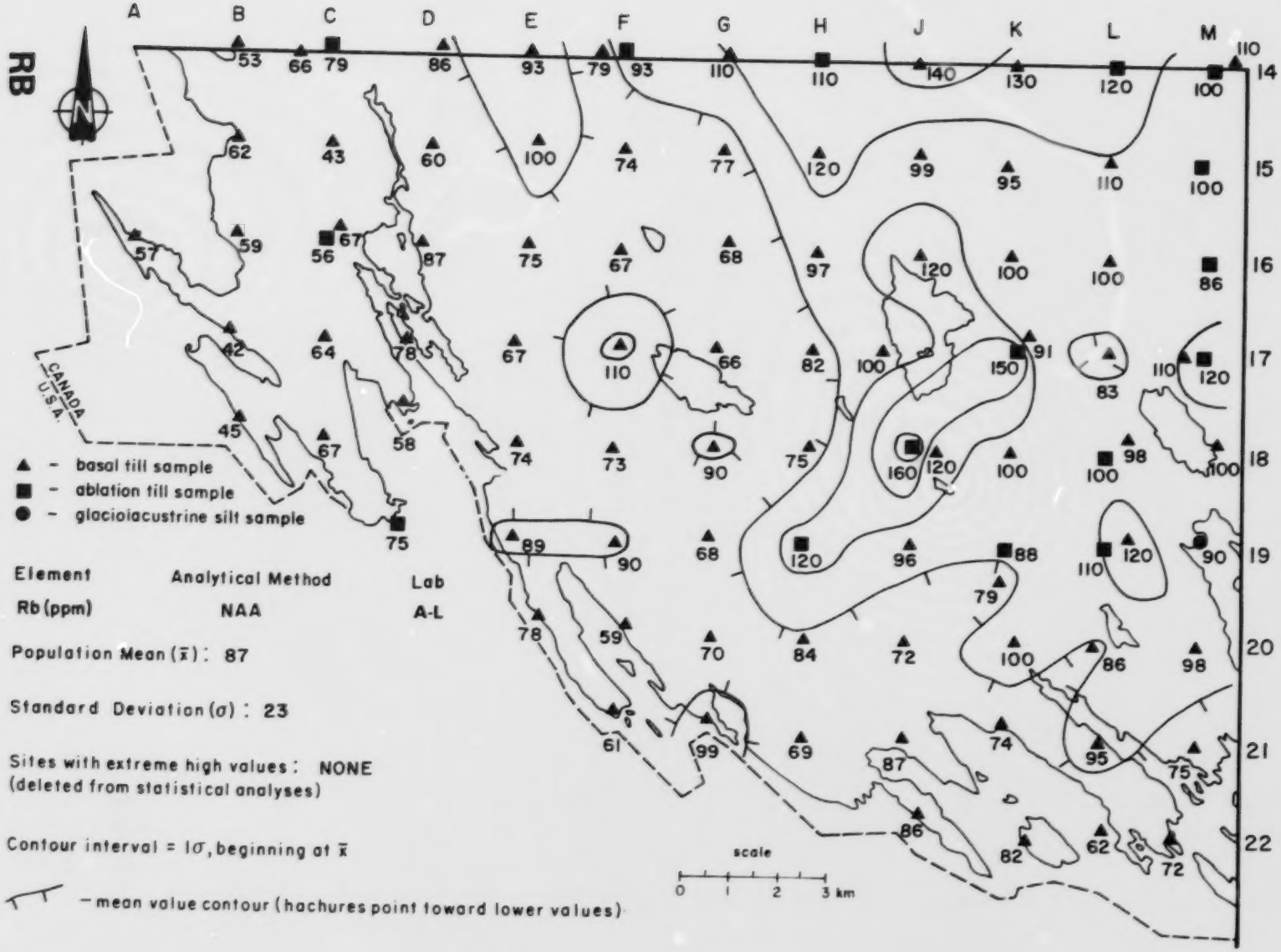

MN
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
CANADA
U.S.A.
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element Analytical Method Lab
Mn (ppm) AA DNRE
Population Mean ($\bar{x}$) : 637
Standard Deviation (σ) : 282
Sites with extreme high values : NONE
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km

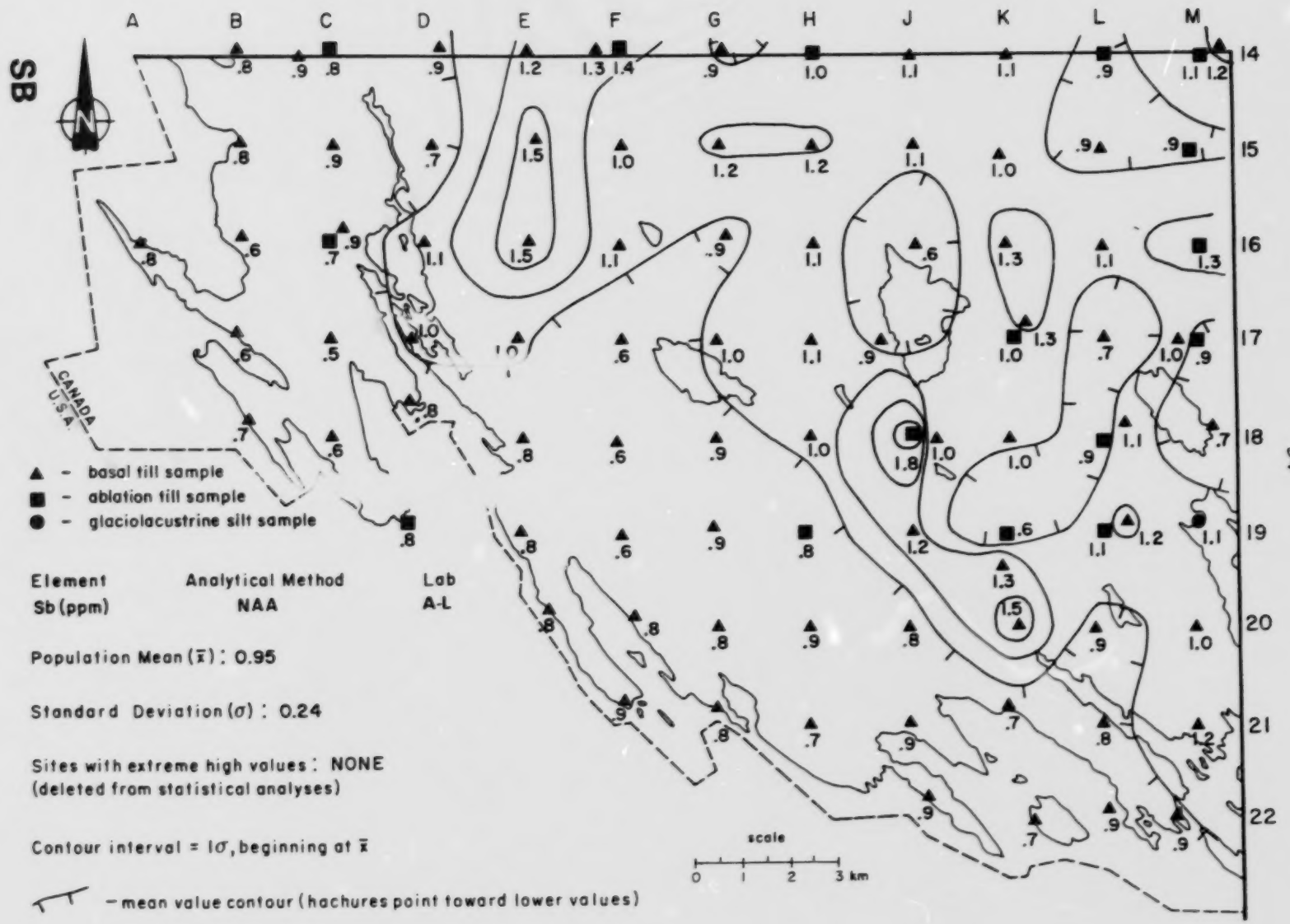

NA
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
CANADA
U.S.A.
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element Analytical Method Lab
Na (%) NAA A-L
Population Mean ($\bar{x}$) : 1.51
Standard Deviation (σ) : 0.19
Sites with extreme high values : NONE
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km

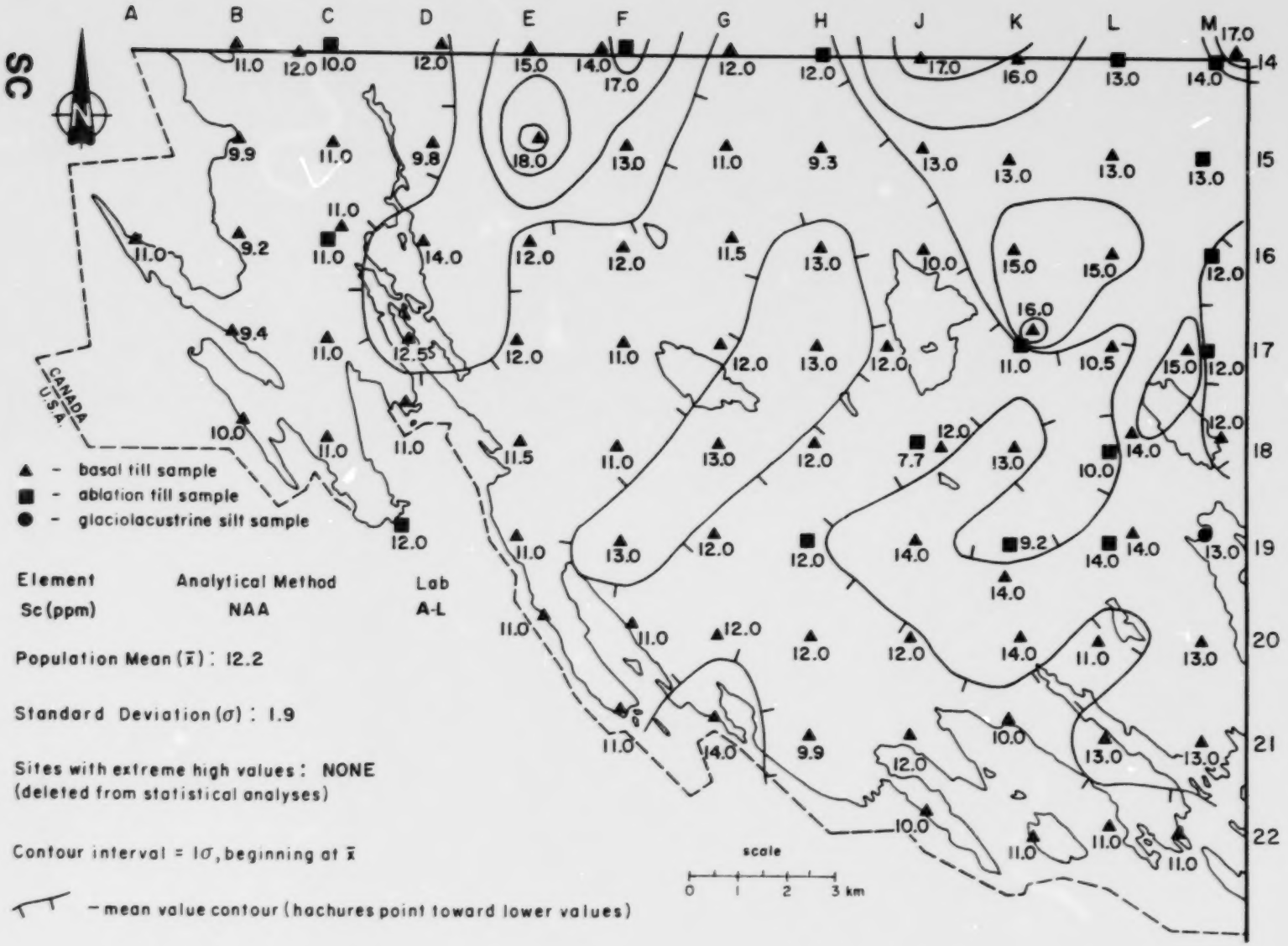

A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
ND
N
CANADA
USA
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element Analytical Method Lab
Nd (ppm) NAA A-L
Population Mean ($\bar{x}$) : 35.2
Standard Deviation (σ) : 6.5
Sites with extreme high values : L 19 Abl
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km

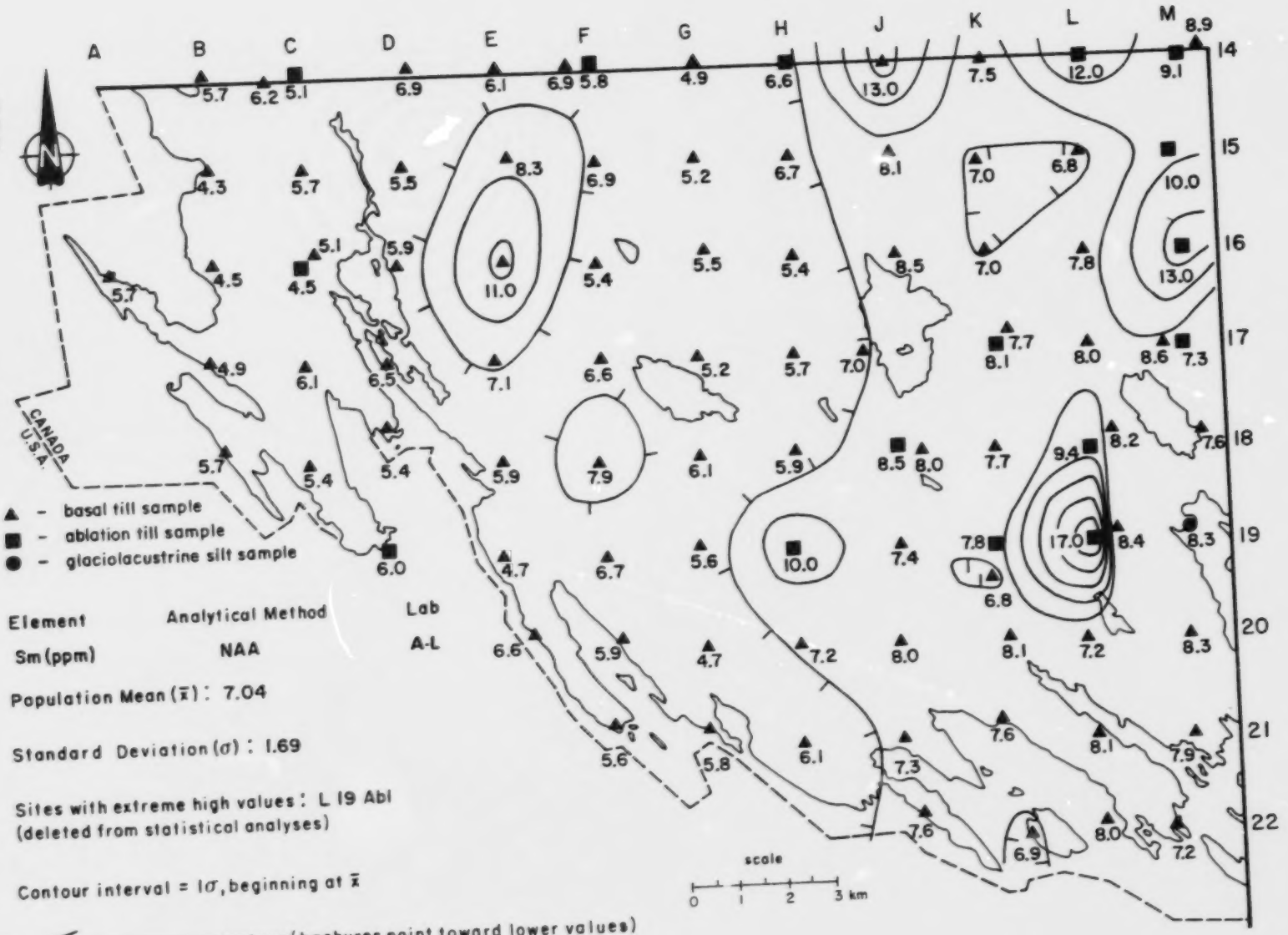

A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
IN
N
CANADA
U.S.A.
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element Analytical Method Lab
Ni(ppm) AA DNRE
Population Mean ($\bar{x}$): 39.2
Standard Deviation (σ): 7.2
Sites with extreme high values: NONE
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km

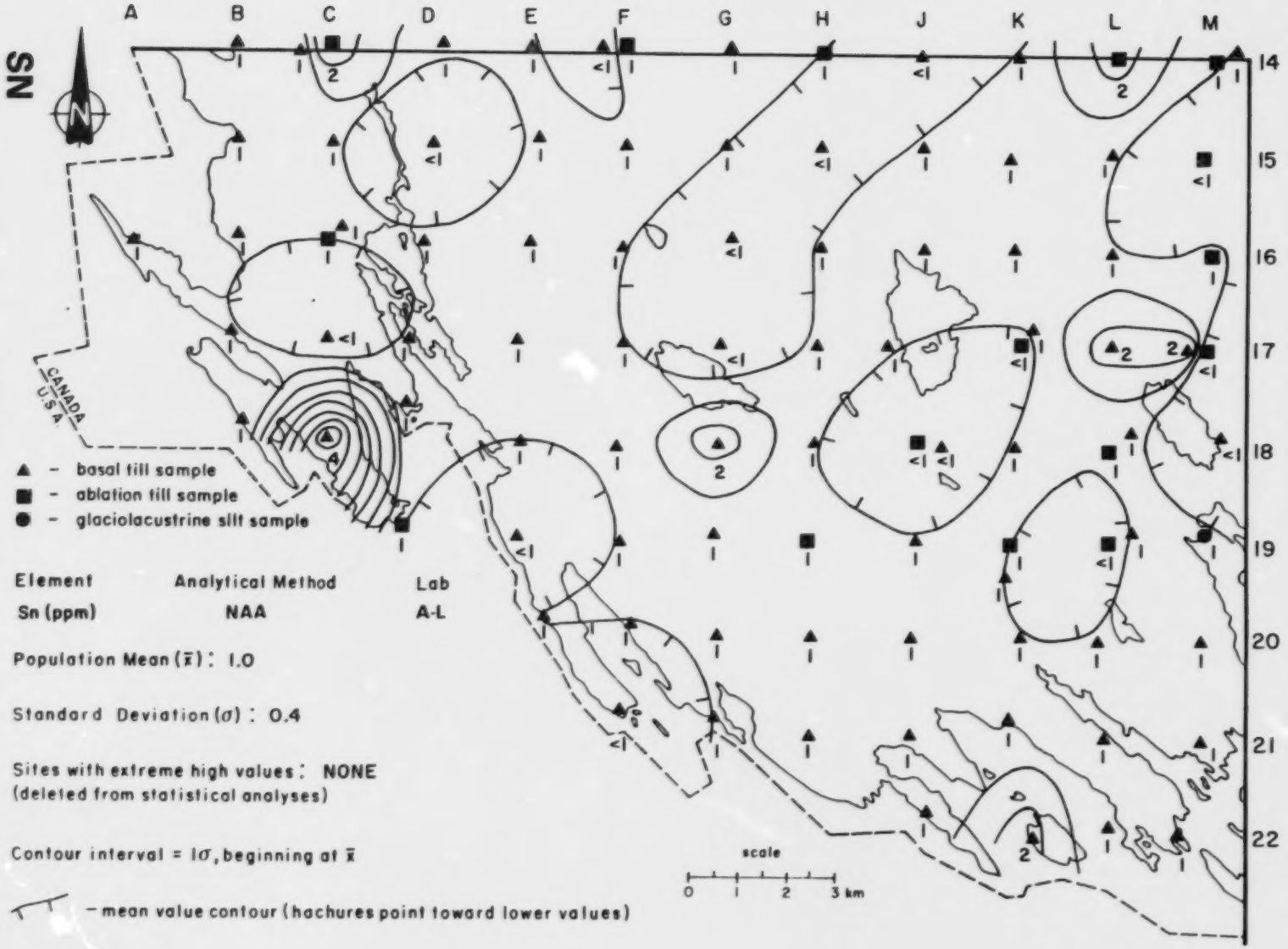

PB
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
CANADA
USA
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element
Pb (ppm)
Analytical Method
AA
Lab
DNRE
Population Mean ($\bar{x}$): 21.4
Standard Deviation (σ): 4.0
Sites with extreme high values: NONE
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km


RB
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
CANADA
U.S.A.
▲ - basal till sample
■ - ablation till sample
● - glacioiacustrine silt sample
Element Analytical Method Lab
Rb (ppm) NAA A-L
Population Mean ($\bar{x}$): 87
Standard Deviation (σ): 23
Sites with extreme high values: NONE
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
- mean value contour (hachures point toward lower values)
scale
0 1 2 3 km


SB
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
CANADA
U.S.A.
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element Analytical Method Lab
Sb (ppm) NAA A-L
Population Mean ($\bar{x}$) : 0.95
Standard Deviation (σ) : 0.24
Sites with extreme high values : NONE
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km


SC
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
CANADA
U.S.A.
▲ - basal till sample
■ - ablation till sample
● - glaciolacustrine silt sample
Element Analytical Method Lab
Sc (ppm) NAA A-L
Population Mean ($\bar{x}$) : 12.2
Standard Deviation (σ) : 1.9
Sites with extreme high values : NONE
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km


SM
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
CANADA
U.S.A.
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element Analytical Method Lab
Sm (ppm) NAA A-L
Population Mean ($\bar{x}$): 7.04
Standard Deviation (σ): 1.69
Sites with extreme high values: L 19 Abl
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
scale
0 1 2 3 km



Element	Analytical Method	Lab
Sn (ppm)	NAA	A-L

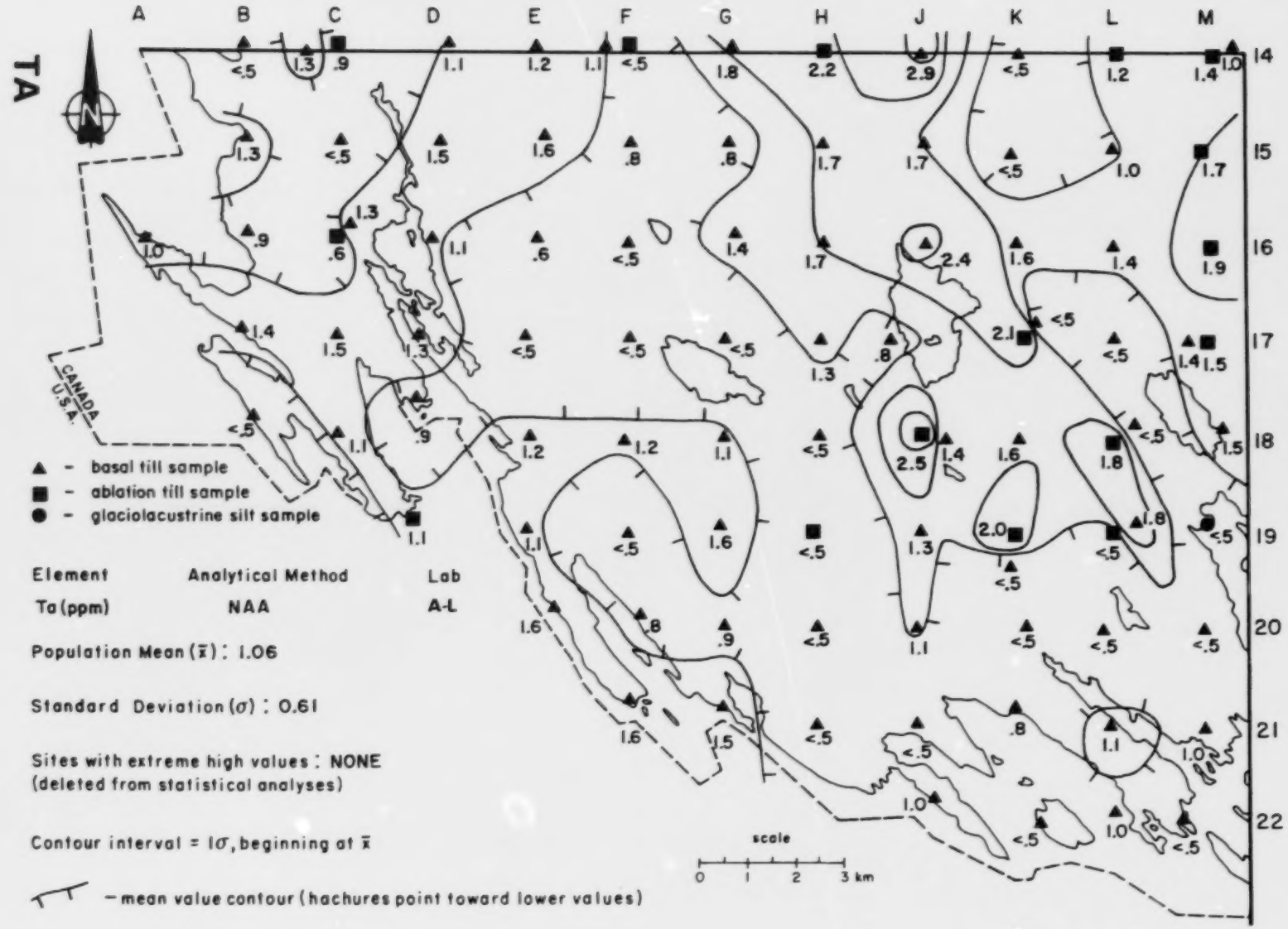
Population Mean ($\bar{x}$): 1.0

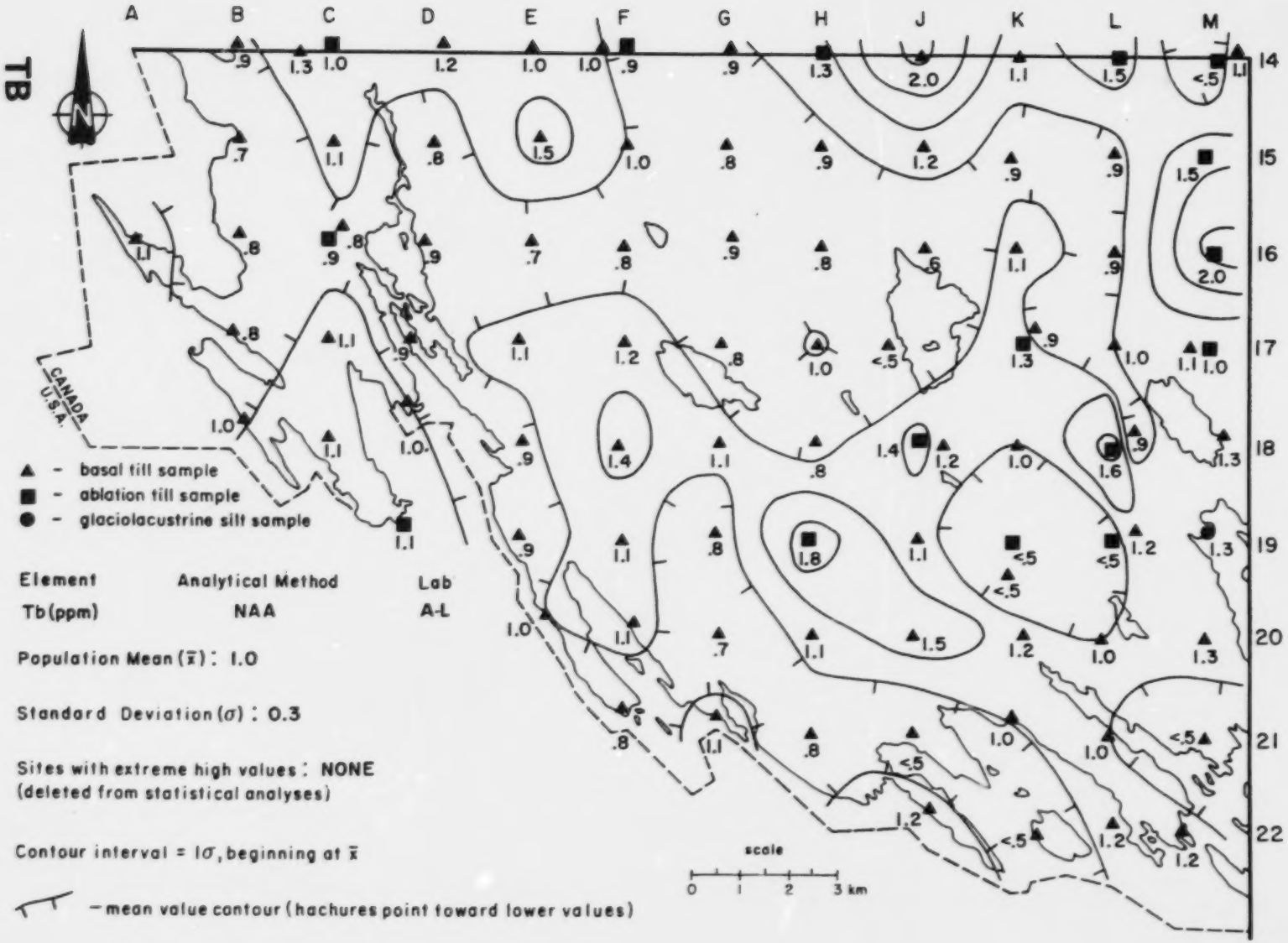
Standard Deviation (σ): 0.4

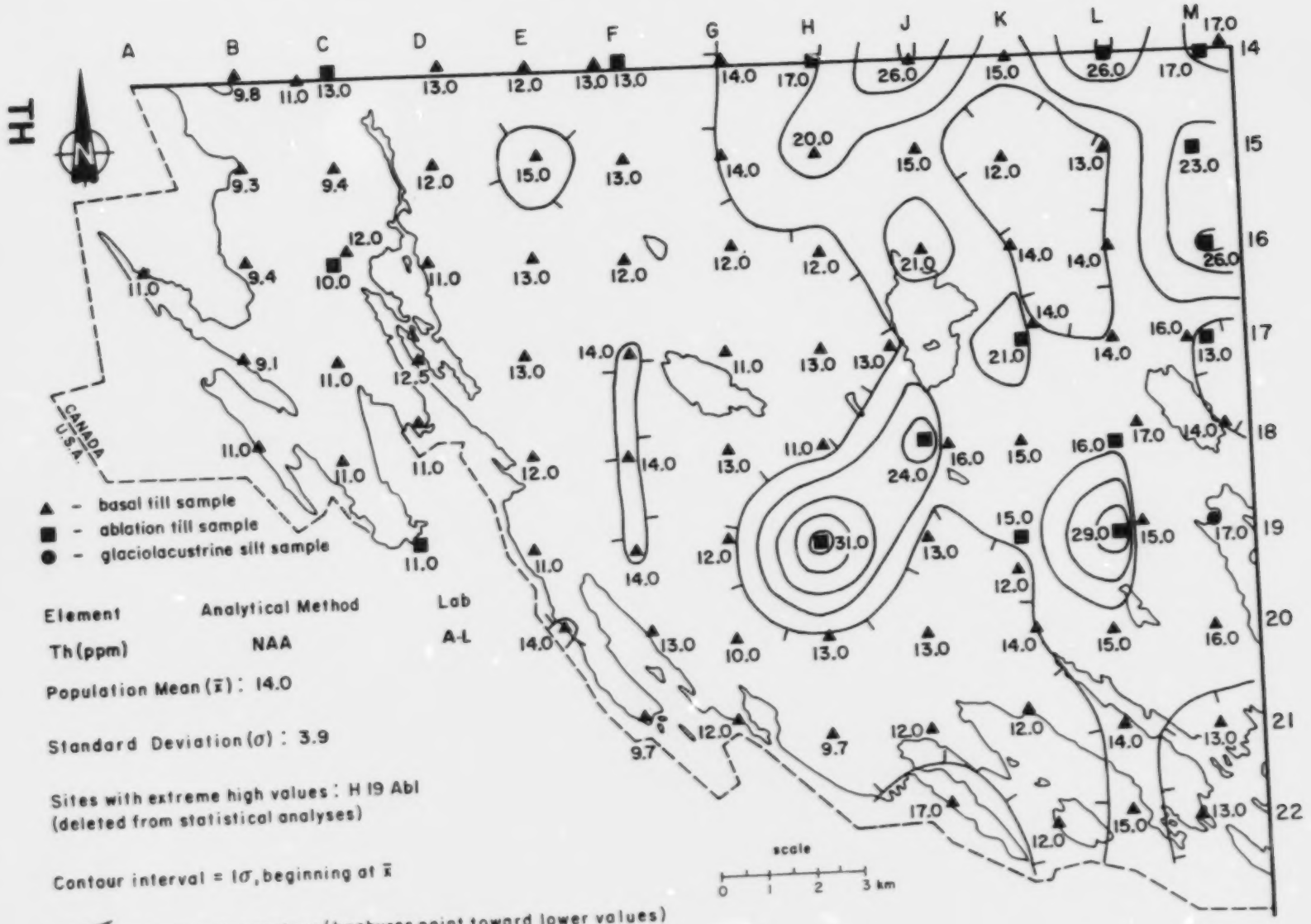
Sites with extreme high values: NONE
(deleted from statistical analyses)

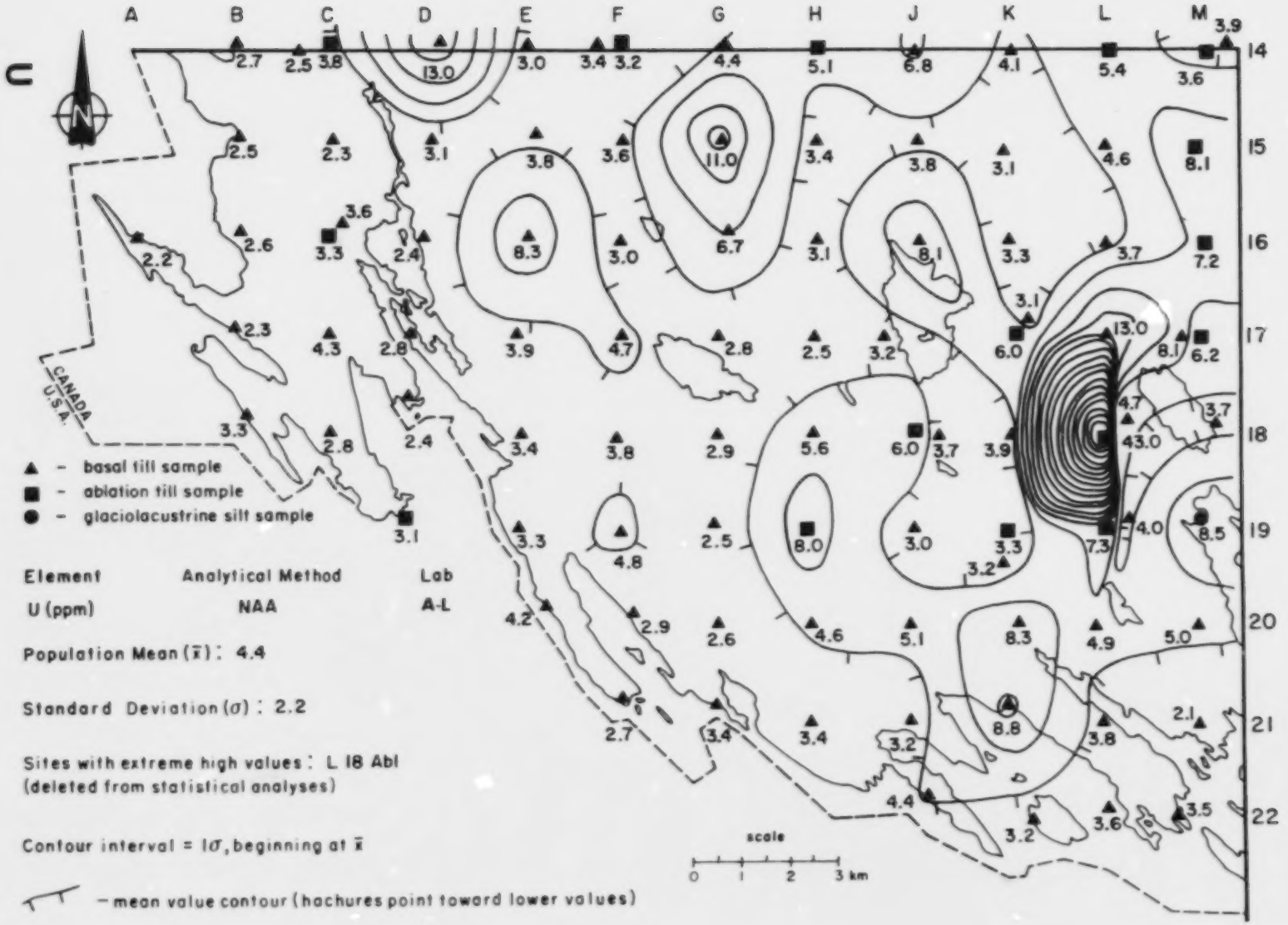
Contour interval = 1σ, beginning at $\bar{x}$

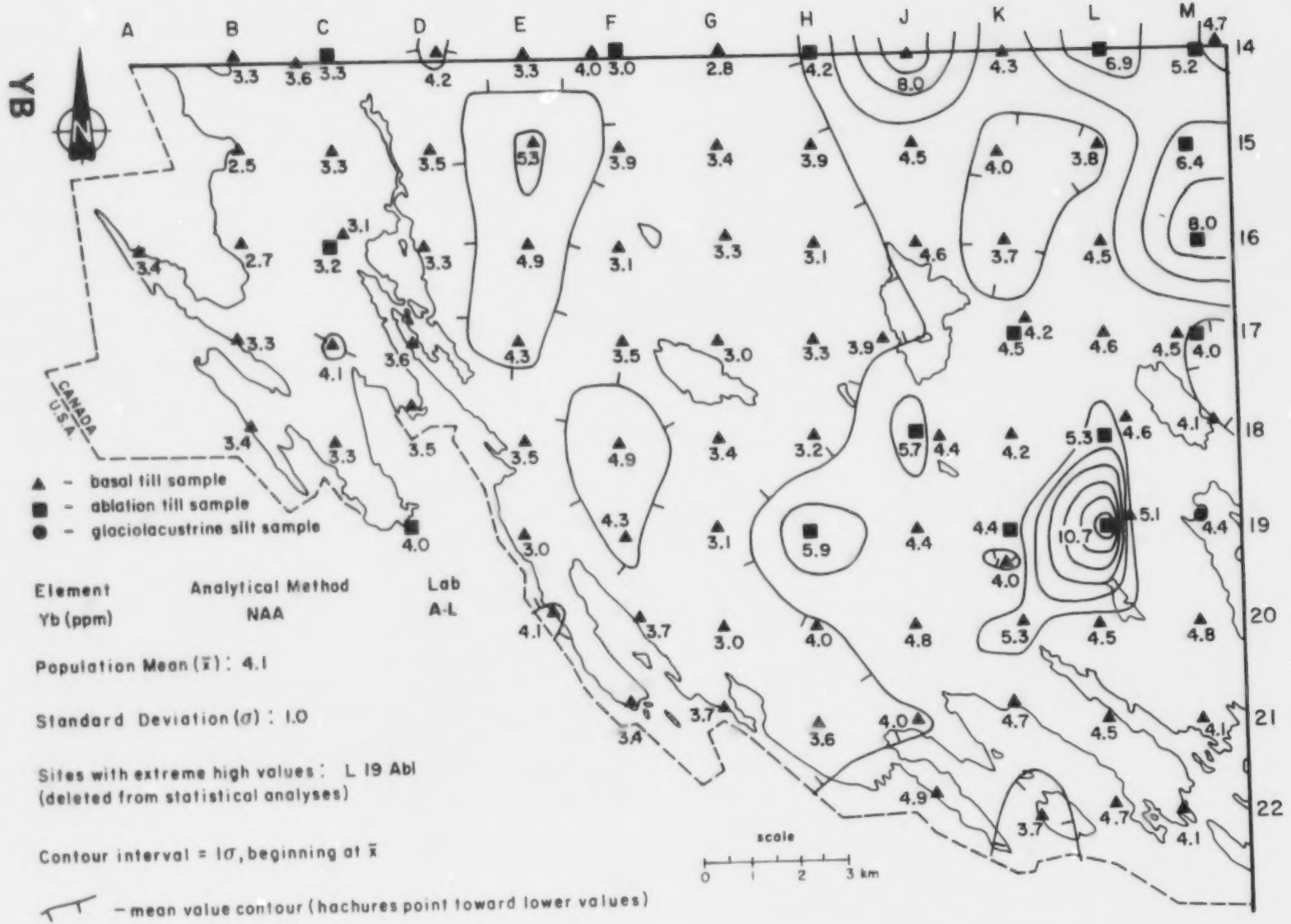
– mean value contour (hachures point toward lower values)

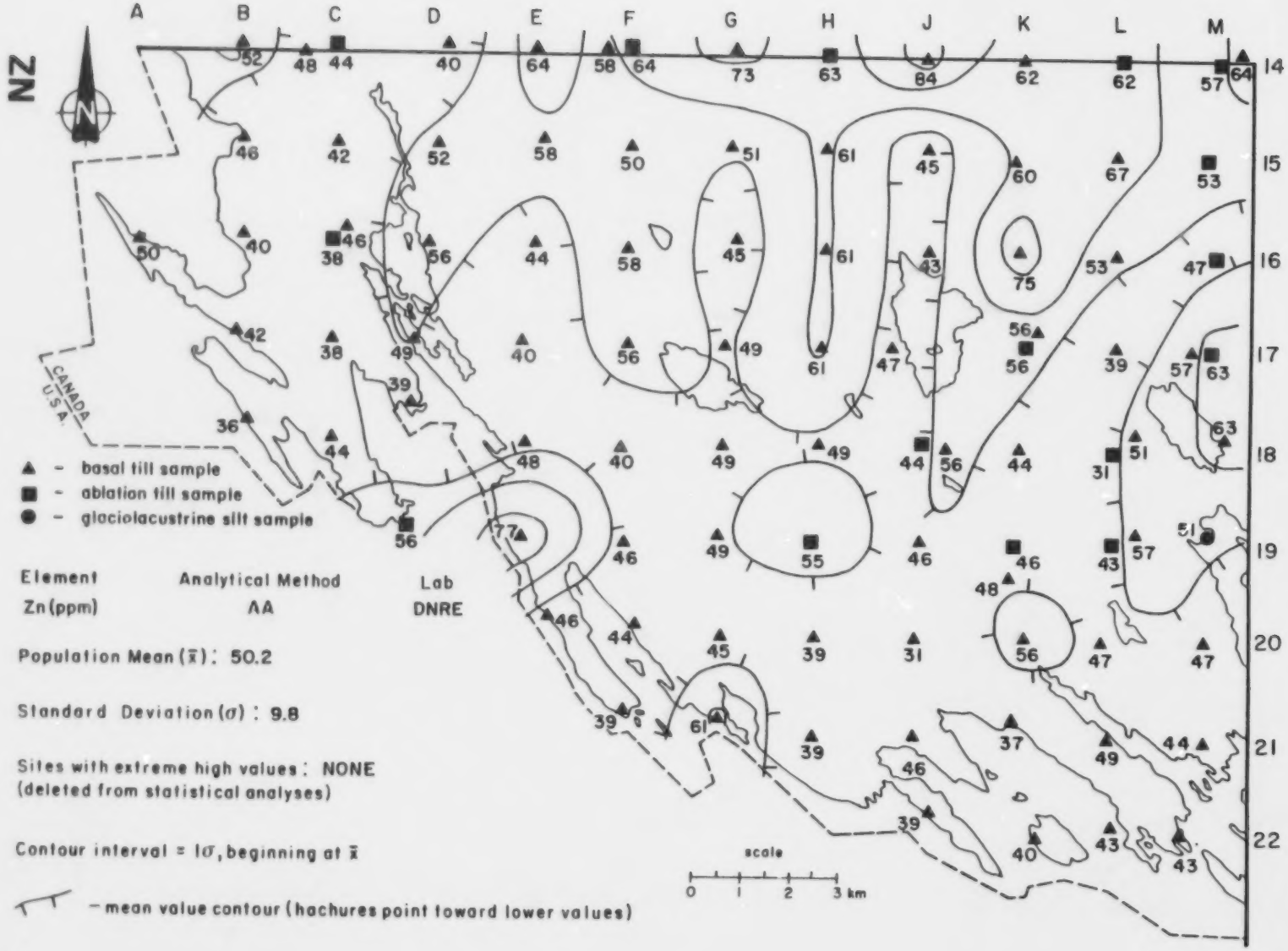

TA
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
CANADA
U.S.A.
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element Analytical Method Lab
Ta (ppm) NAA A-L
Population Mean ($\bar{x}$) : 1.06
Standard Deviation (σ) : 0.61
Sites with extreme high values : NONE
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km

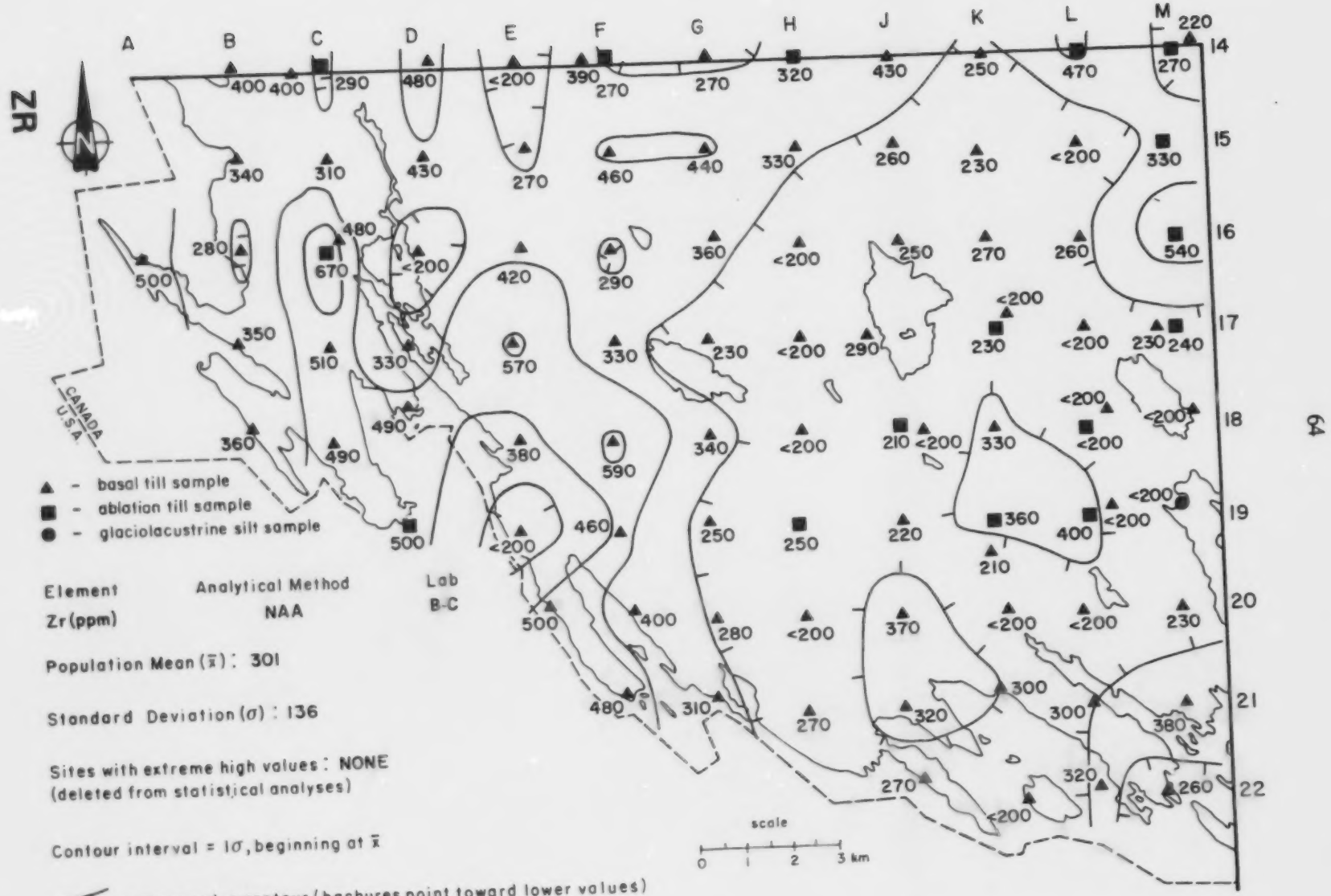

TB
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
CANADA
U.S.A.
▲ - basal till sample
■ - ablation till sample
● - glaciolacustrine silt sample
Element Analytical Method Lab
Tb(ppm) NAA A-L
Population Mean ($\bar{x}$): 1.0
Standard Deviation (σ): 0.3
Sites with extreme high values: NONE
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
- mean value contour (hachures point toward lower values)
scale
0 1 2 3 km


TH
A
B
C
D
E
F
G
H
J
K
L
M
14
15
16
17
18
19
20
21
22
CANADA
U.S.A.
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element
Analytical Method
Lab
Th (ppm)
NAA
A-L
Population Mean ($\bar{x}$) : 14.0
Standard Deviation (σ) : 3.9
Sites with extreme high values : H 19 Abl
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km


A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
N
CANADA
U.S.A.
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element Analytical Method Lab
U (ppm) NAA A-L
Population Mean ($\bar{x}$): 4.4
Standard Deviation (σ): 2.2
Sites with extreme high values: L 18 Abl
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km


YB
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
CANADA
U.S.A.
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
Element Analytical Method Lab
Yb (ppm) NAA A-L
Population Mean ($\bar{x}$) : 4.1
Standard Deviation (σ) : 1.0
Sites with extreme high values : L 19 Abl
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km


NZ
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
CANADA
USA
▲ - basal till sample
■ - ablation till sample
● - glaciolacustrine silt sample
Element
Zn(ppm)
Analytical Method
AA
Lab
DNRE
Population Mean ($\bar{x}$): 50.2
Standard Deviation (σ): 9.8
Sites with extreme high values: NONE
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km


ZR
A B C D E F G H J K L M
14 15 16 17 18 19 20 21 22
CANADA
U.S.A.
▲ - basal till sample
■ - ablation till sample
● - glaciolacustrine silt sample
Element
Zr(ppm)
Analytical Method
NAA
Lab
B-C
Population Mean ($\bar{x}$) : 301
Standard Deviation (σ) : 136
Sites with extreme high values : NONE
(deleted from statistical analyses)
Contour interval = 1σ, beginning at $\bar{x}$
– mean value contour (hachures point toward lower values)
scale
0 1 2 3 km

APPENDIX C. TILL SAMPLE GEOCHEMICAL DATA, FOREST CITY (21 G/12)

Appendix C-1. Ag, As, Au, Ba, Br, Cd, Ce 67
Appendix C-2. Co, Cr, Cs, Cu, Eu 69
Appendix C-3. Fe, Hf, Hg, La, Lu, Mn 71
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Appendix C-1. Till Sample Geochemical Data: Ag, As, Au, Ba, Br, Cd, Ce

Site Lab	Ag (ppm)	As (ppm)		Au (ppb)		Ba (ppm)		Br (ppm)		Cd (ppm)	Ce (ppm)	
	DNRE	ACTLABS	B-C	ACTLABS	B-C	ACTLABS	B-C	ACTLABS	B-C	B-C	ACTLABS	B-C
A 16	0.7	13	12	3	2	320	280	4.5	5.8	<0.2	99	86
B 14	0.3	9.6	7.8	2	<2	400	320	1.6	1.3	<0.2	72	65
B 15	0.3	8.2	7.5	<2	<2	400	310	<0.5	1.6	0.3	72	73
B 16	0.3	6.4	6.8	<2	<2	340	300	1.9	2.0	0.4	74	78
B 17	0.3	7.1	6.9	5	<2	390	320	2.7	2.6	0.3	77	73
B 18	0.3	14	12	<2	<2	280	240	21	25	0.4	99	91
C 14A	0.3	8.8	7.8	<2	<2	380	260	14	15	0.5	90	78
C 14B	0.3	11	10	<2	<2	440	310	<0.5	0.6	0.3	83	75
C 15	0.7	11	11	<2	<2	320	280	<0.5	1.0	0.3	80	73
C 16A	1.0	11	12	<2	<2	350	280	22	25	<0.2	100	100
C 16B	0.7	10	10	3	<2	300	280	14	15	0.3	110	100
C 17	0.7	6.8	5.3	<2	<2	390	250	<0.5	1.3	<0.2	87	67
C 18	0.7	11	11	<2	<2	300	310	10	13	<0.2	94	85
D 14	0.7	8.6	7.9	5	3	440	260	<0.5	<0.5	0.4	99	83
D 15	0.7	7.2	7.0	<2	<2	360	290	6.9	7.1	<0.2	83	74
D 16	0.7	12	11	3	<2	440	360	1.8	1.3	0.4	86	76
D 17M	0.7	15	12	5	<2	370	270	6.3	5.8	<0.2	120	99
D 17B	0.7	12	10	<2	<2	440	310	2.6	1.6	<0.2	91	75
D 18	0.3	9.4	8.8	<2	<2	370	270	6.0	6.3	<0.2	97	89
D 19A	1.0	15	13	<2	<2	400	290	4.9	5.0	<0.2	98	87
E 14	0.7	14	11	<2	<2	520	360	3.8	2.5	<0.2	94	74
E 15	0.7	16	11	<2	<2	540	330	<0.5	0.6	<0.2	110	79
E 16	0.7	16	7.1	<2	<2	860	320	18	1.1	<0.2	130	77
E 17	0.7	11	11	<2	<2	440	340	3.9	4.2	<0.2	110	86
E 18	0.7	7.1	6.9	2	<2	380	320	0.9	1.5	<0.2	87	77
E 19	1.0	7.4	7.3	<2	<2	330	220	38	40	<0.2	76	62
E 20	1.0	9.9	9.2	5	<2	430	280	9.6	11	<0.2	100	93
F 14A	0.7	21	17	4	4	480	330	1.6	1.3	<0.2	100	82
F 14B	0.7	18	15	5	<2	430	360	<0.5	1.1	<0.2	97	87
F 15	0.7	12	12	7	<2	360	300	6.2	6.7	<0.2	100	97
F 16	0.3	10	9.1	3	3	430	310	3.4	2.7	<0.2	87	68
F 17	0.7	4.1	2.9	3	<2	380	250	11	11	<0.2	90	73
F 18	0.7	7.1	7.0	<2	<2	450	270	5.4	5.9	<0.2	100	94
F 19	0.7	5.9	6.7	5	<2	450	380	3.9	4.9	<0.2	97	94
F 20	0.7	12	11	<2	<2	350	260	22	24	0.3	110	78
F 21	0.7	8.5	9.0	<2	<2	420	360	<0.5	0.8	<0.2	75	74
G 14	0.3	11	8.9	<2	<2	450	250	73	65	<0.2	77	52
G 15	1.0	14	13	9	<2	370	290	9.2	11	0.3	88	81
G 16	1.0	9.7	8.7	5	<2	390	300	9.2	10	<0.2	93	83
G 17	0.7	10	9.2	<2	<2	460	330	<0.5	1.4	<0.2	84	74
G 18	0.7	9.2	10	<2	<2	390	370	<0.5	1.2	0.4	99	90
G 19	0.7	11	10	<2	<2	330	340	4.2	5.1	<0.2	92	83
G 20	1.0	9.3	7.8	<2	<2	410	330	5.1	5.6	0.7	74	63
G 21	1.0	10	8.1	5	2	470	330	16	18	<0.2	92	79
H 14A	0.7	13	9.4	<2	<2	420	300	7.7	8.2	IS	98	90
H 15	0.3	11	7.8	<2	<2	410	250	11	11	0.4	110	[illegible]
H 16	0.7	14	16	<2	<2	460	490	8.1	9.3	0.3	84	
H 17	0.7	11	13	<2	<2	500	410	1.6	1.5	0.3	90	[illegible]
H 18	0.7	6.8	7.7	<2	<2	340	350	3.1	3.2	0.3	91	64
H 19A	0.7	5.8	7.0	<2	<2	390	280	8.2	8.5	<0.2	160	140
H 20	0.3	10	10	<2	<2	430	300	3.0	2.3	<0.2	97	81
H 21	0.3	6.2	8.2	3	<2	360	340	3.6	5.0	0.3	86	95

Site	Lab	Ag (ppm)	As (ppm)		Au (ppb)		Ba (ppm)		Br (ppm)		Cd (ppm)	Ce (ppm)	
		DNRE	ACTLABS	B-C	ACTLABS	B-C	ACTLABS	B-C	ACTLABS	B-C	B-C	ACTLABS	B-C
J	14	0.3	11	8.6	<2	<2	500	360	12	10	<0.2	170	140
J	15	0.3	11	13	<2	<2	390	340	7.0	6.9	0.3	120	110
J	16	0.7	6.9	7.6	<2	<2	420	260	3.5	3.5	0.5	115	110
J	17	0.3	9.7	8.9	<2	<2	340	340	2.3	2.1	<0.2	96	78
J	18A	1.0	6.6	7.5	<2	<2	340	330	11	14	0.4	110	87
J	18B	1.0	11	16	<2	4	380	500	<0.5	0.6	0.5	100	100
J	19	0.7	12	14	<2	3	440	440	<0.5	1.6	0.4	100	80
J	20	0.7	6.4	9.4	<2	<2	350	390	<0.5	2.5	0.5	100	99
J	21	0.7	7.2	11	<2	<2	330	450	<0.5	1.3	<0.2	100	97
J	22	0.7	7.5	8.7	<2	<2	330	320	9.1	11	<0.2	110	91
K	14	0.7	11	11	2	<2	530	400	8.5	8.0	<0.2	110	90
K	15	0.7	12	14	<2	3	530	470	11	11	<0.2	96	80
K	16	0.3	12	11	<2	3	440	470	5.6	4.5	<0.2	100	87
K	17A	0.3	17	17	<2	<2	490	310	7.5	7.4	0.4	110	90
K	17B	1.0	10	11	<2	<2	540	450	2.1	0.8	<0.2	110	75
K	18	1.0	12	12	4	<2	360	400	2.0	1.6	<0.2	110	78
K	19A	0.7	1.7	2.0	<2	3	320	350	4.7	5.2	<0.2	100	93
K	19B	0.7	13	15	<2	3	340	420	4.2	4.0	<0.2	98	80
K	20	0.7	18	21	3	3	410	360	<0.5	2.1	<0.2	100	93
K	21	0.7	7.8	9.3	4	<2	330	260	2.5	2.2	0.3	94	78
K	22	0.7	5.0	7.4	<2	<2	400	380	<0.5	2.2	<0.2	100	99
L	14A	0.3	9.9	10	9	<2	440	350	14	15	<0.2	160	150
L	15	0.3	10	11	<2	<2	500	360	26	25	0.6	97	76
L	16	1.0	10	11	<2	<2	410	390	3.7	3.5	0.4	110	93
L	17	0.3	4.9	5.9	<2	<2	390	270	<0.5	1.7	0.3	110	100
L	18A	0.7	5.6	6.1	<2	<2	420	140	36	35	0.5	110	92
L	18B	0.7	12	10	<2	<2	420	370	5.3	4.4	0.5	120	84
L	19A	0.7	15	17	<2	10	490	280	12	14	<0.2	190	150
L	19B	0.7	11	13	<2	<2	480	430	<0.5	1.1	<0.2	110	93
L	20	0.3	14	8.2	<2	<2	470	320	19	1.9	0.3	110	83
L	21	0.3	8.7	15	<2	<2	410	320	3.3	21	0.3	110	96
L	22	0.3	11	12	4	3	430	340	9.4	11	<0.2	120	110
M	14A	0.7	17	18	<2	8	430	430	9.0	8.6	<0.2	130	120
M	14B	0.3	22	21	<2	<2	560	410	7.7	7.0	<0.2	120	93
M	15A	0.7	9.8	11	<2	<2	440	320	<0.5	2.0	0.5	140	120
M	16A	0.7	15	19	4	<2	420	370	18	20	<0.2	170	170
M	17A	0.7	4.1	2.4	<2	<2	480	340	7.8	7.9	0.4	110	76
M	17B	0.7	8.7	8.6	4	<2	590	360	7.0	5.8	<0.2	120	98
M	18	0.7	5.4	6.4	<2	<2	450	400	8.4	7.0	<0.2	98	77
M	19L	0.7	8.9	8.0	4	3	480	360	2.9	2.9	<0.2	120	91
M	20	0.3	9.4	8.3	2	<2	410	380	3.7	4.1	<0.2	110	91
M	21	0.3	14	14	5	3	380	380	<0.5	1.4	<0.2	100	94
M	22	0.7	8.8	8.5	<2	<2	420	290	9.6	8.6	<0.2	110	84
MAX		1.0	22	21	9	10	860	500	73	65	0.7	190	170
MIN		0.3	1.7	2.0	<2	<2	280	140	<0.5	<0.5	<0.2	72	52
AVG		0.6	10.5	10.3	2.0	1.5	418	333	7.5	7.7	0.2	103	89
STD		0.2	3.6	3.6	1.8	1.3	77	63	9.9	9.5	0.2	21	19
22A		0.7	8	11	<2	<2	360	350	6.1	7.2	0.4	120	120
22Bt		1.0	15	13	<2	<2	380	400	<0.5	<0.5	0.6	98	75
22Bm		1.0	13	14	4	<2	530	420	<0.5	<0.5	<0.2	93	80
22Bb		1.0	13	14	<2	5	500	440	<0.5	0.7	IS	110	86

ACTLABS - Activation Laboratories Ltd.
B-C - Bondar-Clegg & Company Ltd.
DNRE - New Brunswick Dept. of Natural Resources and Energy

IS - insufficient sample

Appendix C-2. Till Sample Geochemical Data: Co, Cr, Cs, Cu, Eu

	Co (ppm)			Cr (ppm)		Cs (ppm)		Cu (ppm)	Eu (ppm)	
Site Lab	ACTLABS	B-C	DNRE	ACTLABS	B-C	ACTLABS	B-C	DNRE	ACTLABS	B-C
A 16	9	13	17.4	86	76	2	3.3	23.6	1.4	1
B 14	9	12	17.4	87	82	2	2.8	18.2	1.4	<1
B 15	9	14	19.1	77	80	2	2.5	21.6	1.1	<1
B 16	8	13	16.5	74	89	2	2.3	15.8	1.1	<1
B 17	8	14	17.8	81	97	2	2.4	15.3	1.2	1
B 18	10	15	18.2	82	87	2	2.5	18.2	1.3	2
C 14A	9	13	16.5	78	82	4	4.6	20.2	1.2	<1
C 14B	11	14	20.8	87	79	3	2.8	24.6	1.5	1
C 15	10	15	18.2	79	94	2	2.4	22.2	1.5	<1
C 16A	11	16	20.0	97	100	2	2.5	19.7	1.2	<1
C 16B	10	13	20.0	82	75	3	3.8	25.6	1.3	<1
C 17	8	9	16.5	85	72	2	2.2	13.8	1.4	<1
C 18	8	13	18.2	90	92	2	3.1	22.2	1.3	<1
D 14	9	13	18.2	80	70	4	3.8	24.1	1.7	<1
D 15	8	11	17.4	99	100	2	2.9	12.8	1.2	1
D 16	12	17	25.2	97	88	4	4.0	28.0	1.4	1
D 17M	12	16	23.4	96	91	3	2.7	26.6	1.6	1
D 17B	14	18	26.0	98	85	3	2.9	26.1	1.5	1
D 18	10	13	19.1	83	83	3	2.6	19.2	1.3	<1
D 19A	10	13	16.0	95	86	3	3.3	21.4	1.5	1
E 14	14	17	22.4	110	93	4	3.5	27.9	1.5	1
E 15	17	19	22.4	120	88	4	3.4	30.4	2.1	1
E 16	17	12	21.6	51	72	2	2.9	18.9	2.2	1
E 17	10	13	16.8	93	79	3	3.3	20.4	1.7	<1
E 18	9	11	16.0	79	76	3	3.9	17.4	1.4	<1
E 19	8	7	16.0	74	63	8	8.6	18.9	1.0	<1
E 20	10	16	16.0	83	76	3	3.5	16.4	1.5	1
F 14A	14	18	24.8	110	94	6	5.6	44.3	1.4	1
F 14B	13	21	24.0	98	99	3	3.5	33.4	1.7	2
F 15	11	17	20.0	86	89	4	3.9	26.9	1.5	2
F 16	14	18	23.2	100	90	3	3.0	26.4	1.2	<1
F 17	9	12	14.4	73	74	7	7.4	19.9	1.4	<1
F 18	9	13	16.8	86	86	3	3.0	19.4	1.8	1
F 19	8	12	15.2	93	90	4	4.1	10.0	1.7	1
F 20	12	16	18.4	90	73	3	3.2	19.9	1.4	<1
F 21	9	13	16.0	79	73	2	3.0	16.4	1.4	<1
G 14	11	12	19.2	94	61	8	7.0	30.4	1.1	<1
G 15	12	17	20.0	96	100	5	5.0	26.4	1.2	1
G 16	10	14	16.2	97	95	3	3.4	27.0	1.3	<1
G 17	10	14	17.0	87	90	3	3.6	24.0	1.3	<1
G 18	11	16	17.0	92	87	4	4.5	23.5	1.4	1
G 19	11	16	17.9	84	80	3	3.5	25.0	1.3	2
G 20	10	14	14.6	95	89	3	3.3	19.5	1.1	<1
G 21	12	16	18.7	100	92	5	4.5	21.5	1.4	<1
H 14A	11	16	18.7	68	64	8	8.8	28.5	1.4	1
H 15	9	11	15.4	77	62	9	8.6	24.0	1.3	<1
H 16	13	18	21.9	93	120	4	7.4	33.5	1.3	<1
H 17	11	13	22.7	83	120	4	6.9	31.5	1.3	<1
H 18	12	12	17.0	88	95	3	4.1	20.5	1.3	<1
H 19A	11	12	17.0	62	74	9	13	30.0	1.6	<1
H 20	12	11	17.0	82	110	3	4.8	22.5	1.6	1
H 21	9	12	14.6	71	100	2	4.3	13.5	1.3	1

Site Lab	Co (ppm)			Cr (ppm)		Cs (ppm)		Cu (ppm)	Eu (ppm)	
	ACTLABS	B-C	DNRE	ACTLABS	B-C	ACTLABS	B-C	DNRE	ACTLABS	B-C
J 14	14	16	22.7	65	94	9	12	30.0	2.2	2
J 15	12	15	17.9	83	110	4	6.2	34.5	1.7	1
J 16	8	10	14.6	64	87	7	10	21.0	1.6	<1
J 17	12	12	18.7	70	86	4	5.3	22.5	1.5	<1
J 18A	8	13	10.0	47	63	9	16	27.1	1.3	2
J 18B	14	18	18.3	68	110	7	13	33.1	1.6	1
J 19	13	14	15.8	82	110	4	6.0	27.6	1.7	<1
J 20	9	14	10.0	81	130	3	4.9	19.1	1.8	<1
J 21	11	16	14.2	79	110	3	5.2	20.6	1.7	1
J 22	10	12	10.8	58	85	4	6.8	15.6	1.5	1
K 14	14	15	18.3	94	97	4	6.8	33.6	1.6	<1
K 15	12	14	15.8	110	120	4	5.6	30.1	1.7	1
K 16	15	16	17.5	100	110	4	6.1	28.6	1.5	<1
K 17A	15	18	15.8	59	77	9	13	44.7	1.5	<1
K 17B	15	16	18.3	92	95	5	7.5	29.1	1.8	1
K 18	12	12	15.8	72	79	5	7.0	26.1	1.7	<1
K 19A	7	8	9.2	67	100	8	14	9.5	1.5	<1
K 19B	16	20	20.0	90	120	3	4.5	31.6	1.6	1
K 20	17	22	23.3	84	130	6	11	40.7	1.9	1
K 21	10	11	11.7	71		2	3.7	18.1	1.8	1
K 22	10	13	15.0	80	96	3	4.3	17.6	1.6	1
					96					
L 14A	15	17	20.0	57	56	6	8.5	22.1	1.7	<1
L 15	11	11	14.2	100	100	5	6.8	22.8	1.4	<1
L 16	14	14	19.4	89	100	4	5.4	28.0	1.6	<1
L 17	9	10	13.5	76	110	4	5.8	15.5	1.7	1
L 18A	7	7	9.3	75	70	17	23	13.0	2.1	<1
L 18B	14	13	17.7	89	69	5	6.2	29.5	1.6	<1
L 19A	16	18	20.3	74	99	5	8.1	31.5	3.2	2
L 19B	14	15	17.7	73	100	6	10	25.0	1.8	<1
L 20	11	12	12.7	91	86	4	4.2	27.5	1.6	1
L 21	10	13	13.5	85	98	4	5.4	19.0	1.8	1
L 22	11	13	13.5	93	130	3	4.8	27.0	1.7	<1
M 14A	16	19	16.9	100	130	3	5.9	32.5	1.8	<1
M 14B	19	16	18.6	110	120	5	6.3	35.0	1.9	<1
M 15A	11	15	13.5	70	93	5	6.3	29.0	1.8	<1
M 16A	15	18	15.2	87	130	4	5.8	30.0	2.1	2
M 17A	9	10	9.3	79	99	18	23	13.0	1.5	<1
M 17B	13	14	15.2	96	110	5	6.3	27.0	1.8	2
M 18	11	12	14.4	84	110	5	6.7	18.5	1.6	<1
M 19L	12	10	13.5	81	74	4	6.0	22.0	1.7	<1
M 20	10	12	12.7	88	95	4	6.3	22.0	1.8	<1
M 21	13	15	15.2	80	100	3	5.0	28.5	1.7	1
M 22	10	10	13.2	78	71	3	4.1	19.4	1.7	<1
MAX	19	22	26.0	120	130	18	23	44.7	3.2	2
MIN	7	7	9.2	47	56	2	2.2	9.5	1.0	<1
AVG	11	14	17.2	84	92	4	5.9	24.1	1.6	-
STD	3	3	3.6	13	17	3	3.8	6.8	0.3	-
22A	10	14	15.3	55	92	4	7.2	19.2	1.7	1
22Bt	17	17	22.4	110	86	4	5.4	35.9	1.8	<1
22Bm	20	22	26.5	110	130	4	5.3	37.4	1.8	<1
22Bb	20	21	24.8	110	110	4	5.6	32.4	1.7	1

ACTLABS - Activation Laboratories Ltd.
B-C - Bondar-Clegg & Company Ltd.
DNRE - New Brunswick Dept. of Natural Resources and Energy

Appendix C-3. Till Sample Geochemical Data: Fe, Hf, Hg, La, Lu, Mn

Site Lab	Fe (%)			Hf (ppm)		Hg (ppb)	La (ppm)		Lu (ppm)		Mn (ppm)
	ACTLABS	B-C	DNRE	ACTLABS	B-C	B-C	ACTLABS	B-C	ACTLABS	B-C	DNRE
A 16	2.74	2.8	2.59	13	10	68	38	41	0.61	0.5	426.0
B 14	2.69	2.7	2.48	12	10	32	36	40	0.62	0.5	506.4
B 15	2.56	2.7	2.57	8	7	29	33	39	0.46	0.4	610.9
B 16	2.33	2.6	2.15	11	10	29	33	39	0.50	0.4	466.2
B 17	2.41	2.7	2.21	13	11	29	33	38	0.56	0.5	337.6
B 18	2.26	2.5	2.04	14	12	116	32	35	0.67	0.6	377.8
C 14A	2.77	2.8	2.48	12	9	58	38	40	0.58	0.4	402.0
C 14B	3.04	2.8	2.70	12	9	35	40	41	0.66	0.4	860.1
C 15	2.68	2.7	2.45	11	10	26	37	40	0.59	0.5	755.6
C 16A	2.82	3.0	2.46	17	14	90	29	32	0.61	0.4	418.0
C 16B	2.95	2.8	2.46	13	10	68	36	37	0.58	0.4	458.2
C 17	2.53	2.0	2.11	17	12	23	40	35	0.73	0.4	321.5
C 18	2.86	2.6	2.54	13	10	55	37	38	0.61	0.4	377.8
D 14	2.74	2.5	2.34	14	10	23	48	47	0.74	0.3	779.7
D 15	2.76	2.6	2.36	16	12	32	37	37	0.65	0.5	562.7
D 16	3.57	3.5	3.07	9	7	26	39	40	0.60	0.5	836.0
D 17M	3.36	3.0	2.85	14	10	64	48	45	0.69	0.5	795.8
D 17B	3.50	3.2	2.94	10	7	29	42	40	0.62	0.5	908.4
D 18	2.78	2.7	2.35	14	10	84	39	41	0.61	0.5	430.0
D 19A	3.28	3.1	2.36	15	12	48	38	38	0.72	0.6	285.7
E 14	3.99	3.2	3.18	9	6	35	44	38	0.59	0.3	936.5
E 15	4.46	3.2	3.05	14	8	29	55	43	0.80	0.5	1047.6
E 16	4.13	2.6	2.46	8	8	19	71	41	0.88	0.4	531.8
E 17	2.94	2.7	2.33	16	12	39	47	47	0.76	0.5	579.4
E 18	2.80	2.8	2.35	11	9	23	41	42	0.65	0.5	484.1
E 19	3.30	3.0	2.97	9	5	71	35	34	0.51	0.3	333.3
E 20	2.91	2.9	2.35	15	11	45	46	47	0.74	0.6	381.0
F 14A	4.03	3.6	3.43	10	7	61	41	39	0.60	0.4	1031.8
F 14B	3.63	3.6	3.18	13	10	29	46	47	0.72	0.5	1190.5
F 15	3.10	3.2	2.69	14	12	39	45	49	0.69	0.6	785.7
F 16	3.27	3.0	2.85	12	8	42	40	36	0.54	0.4	1317.5
F 17	1.91	1.8	1.66	10	7	93	42	41	0.62	0.4	182.5
F 18	2.46	2.3	2.15	17	13	42	47	49	0.91	0.8	500.0
F 19	2.68	2.7	2.17	14	11	55	45	48	0.75	0.5	285.7
F 20	3.00	2.6	2.41	14	9	93	37	34	0.68	0.4	388.9
F 21	2.58	2.7	2.10	11	10	23	37	42	0.63	0.5	420.6
G 14	3.59	3.0	2.89	8	4	138	35	30	0.46	0.3	333.3
G 15	3.31	3.5	2.51	14	11	42	39	42	0.59	0.3	829.4
G 16	2.97	2.9	2.45	12	9	48	40	41	0.57	0.3	614.9
G 17	3.04	3.0	2.59	10	8	23	38	40	0.54	0.5	679.6
G 18	3.35	3.4	2.56	11	9	19	44	47	0.59	0.5	647.2
G 19	3.09	3.1	2.77	9	7	29	41	42	0.54	0.4	598.7
G 20	2.99	2.9	2.36	11	8	35	34	36	0.55	0.4	380.3
G 21	3.48	3.2	2.94	12	9	71	35	35	0.70	0.5	380.3
H 14A	3.05	3.1	2.88	9	7		43	44	0.70	0.5	914.2
H 15	3.02	2.4	2.50	11	7	61	49	43	0.64	0.4	388.4
H 16	3.54	3.7	3.14	10	6	51	37	33	0.51	0.8	388.4
H 17	3.27	3.8	3.26	10	7	19	40	38	0.57	0.9	979.0
H 18	3.24	3.0	2.61	9	6	26	41	31	0.44	1.1	598.7
H 19A	3.32	3.4	2.55	16	11	55	68	60	0.95	1.9	517.8
H 20	3.06	3.1	2.38	12	8	26	46	36	0.67	1.2	695.8
H 21	2.55	3.4	2.01	11	9	45	38	40	0.56	1.3	372.2

Site	Lab	Fe (%) ACTLABS	Fe (%) B-C	Fe (%) DNRE	Hf (ppm) ACTLABS	Hf (ppm) B-C	Hg (ppb) B-C	La (ppm) ACTLABS	La (ppm) B-C	Lu (ppm) ACTLABS	Lu (ppm) B-C	Mn (ppm) DNRE
J	14	4.36	4.2	3.12	19	11	26	76	58	1.29	1.8	1068.0
J	15	3.29	3.6	2.54	12	8	334	51	44	0.60	1.1	509.7
J	16	2.57	2.8	2.04	12	7	26	54	47	0.74	1.9	720.1
J	17	2.99	3.0	2.51	12	8	22	45	35	0.65	1.0	752.4
J	18A	1.86	1.7	1.44	12	8	26	49	39	0.87	1.5	323.6
J	18B	3.28	3.6	2.81	10	7	26	47	44	0.75	1.2	1205.5
J	19	3.45	3.4	2.56	12	8	29	48	38	0.65	0.9	825.2
J	20	2.60	3.1	1.94	15	11	32	47	42	0.78	0.6	461.2
J	21	3.17	3.8	2.53	11	9	29	45	43	0.69	1.2	574.4
J	22	2.84	3.0	2.10	13	9	55	47	40	0.77	1.3	380.3
K	14	4.14	4.0	3.21	11	6	45	47	36	0.66	0.9	663.4
K	15	3.62	3.9	2.99	11	7	64	45	37	0.70	1.0	493.5
K	16	3.88	3.8	3.00	10	7	39	46	37	0.65	0.9	1084.1
K	17A	3.20	2.9	2.43	10	6	68	45	36	0.73	1.4	1148.9
K	17B	3.98	3.5	2.96	10	6	26	50	35	0.69	0.8	922.3
K	18	3.18	2.9	2.40	11	7	29	47	33	0.66	0.8	890.0
K	19A	2.16	2.4	1.68	13	9	26	49	43	0.71	1.2	226.5
K	19B	3.64	3.7	2.77	11	7	29	44	36	0.63	0.8	1132.7
K	20	3.91	4.3	3.06	12	8	33	45	40	0.87	1.8	1472.5
K	21	2.42	2.5	1.81	14	10	36	45	38	0.64	2.0	687.7
K	22	2.76	3.1	2.22	10	9	26	46	42	0.63	0.9	428.8
L	14A	3.44	4.1	2.66	20	15	42	70	65	1.15	1.9	784.8
L	15	3.75	3.9	2.78	10	6	81	44	35	0.59	1.1	315.5
L	16	3.67	3.7	2.26	12	8	26	51	40	0.75	0.9	686.9
L	17	2.53	2.9	1.95	14	10	16	52	45	0.74	2.5	263.6
L	18A	2.72	2.7	1.96	14	8	68	57	44	0.94	6.5	119.8
L	18B	3.61	2.8	2.69	13	8	29	54	36	0.74	1.0	758.8
L	19A	3.27	3.1	2.54	24	16	65	78	61	1.66	2.3	1214.1
L	19B	3.59	3.8	2.73	11	8	20	49	43	0.77	1.3	966.4
L	20	3.19	2.8	2.27	15	8	127	44	37	0.76	0.8	631.0
L	21	3.16	3.3	2.40	13	10	26	51	38	0.69	1.2	503.2
L	22	3.18	3.6	2.51	15	11	68	50	45	0.66	1.1	694.9
M	14A	4.00	4.3	2.99	15	11	65	52	45	0.81	1.3	662.9
M	14B	4.77	4.1	3.17	13	7	26	57	39	0.80	0.8	734.8
M	15A	3.07	3.2	2.27	17	11	29	61	50	1.04	1.9	742.8
M	16A	3.26	3.7	2.13	25	20	29	73	69	1.33	2.1	990.4
M	17A	2.89	2.8	1.99	11	6	26	49	37	0.64	1.1	223.6
M	17B	3.57	3.6	2.66	12	7	26	56	41	0.74	1.5	567.1
M	18	3.13	2.8	2.49	11	7	42	48	34	0.71	0.9	575.1
M	19L	3.40	3.0	2.44	11	7	33	55	41	0.71	1.4	479.2
M	20	3.02	3.1	2.31	13	9	33	51	42	0.73	1.1	667.1
M	21	3.11	3.5	2.40	13	10	46	48	43	0.68	0.9	998.4
M	22	2.69	2.7	2.08	13	9	52	45	34	0.75	0.9	445.9

MAX		4.77	4.3	3.43	25	20	334	78	69	1.66	6.5	1472.5
MIN		1.86	1.7	1.44	8	4	16	29	30	0.44	0.3	119.8
AVG		3.15	3.1	2.52	13	9	47	48	41	0.70	0.9	637.1
STD		0.64	0.5	0.39	3	2	38	9	7	0.18	0.8	282.4

22A		2.47	3.2	2.14	15	13	20	52	51	0.93	0.9	704.6
22Bt		4.55	4.2	3.31	10	6	36	44	33	0.60	0.8	899.7
22Bm		4.56	4.4	3.47	10	6	33	45	35	0.72	0.9	1146.5
22Bb		4.79	4.4	3.30	11	7	26	42	33	0.76	1.0	1082.8

ACTLABS - Activation Laboratories Ltd.
B-C - Bondar-Clegg & Company Ltd.
DNRE - New Brunswick Dept. of Natural Resources and Energy

Appendix C-4. Till Sample Geochemical Data: Mo, Na, Nd, Ni, Pb, Rb

Site	Lab	Mo (ppm) ACTLABS	Mo (ppm) B-C	Na (%) ACTLABS	Na (%) B-C	Nd (ppm) ACTLABS	Ni (ppm) ACTLABS	Ni (ppm) B-C	Ni (ppm) DNRE	Pb (ppm) DNRE	Rb (ppm) ACTLABS	Rb (ppm) B-C
A 16		INT	3	1.48	1.4	33	<20	35	39.4	25.7	57	51
B 14		INT	3	1.43	1.4	30	82	27	41.1	25.7	53	58
B 15		INT	3	1.20	1.3	27	<20	25	41.1	25.7	62	56
B 16		INT	3	1.46	1.6	26	<20	27	34.2	22.1	59	51
B 17		INT	3	1.42	1.5	26	<20	24	35.1	22.1	42	54
B 18		INT	4	1.28	1.3	29	<20	22	36.8	25.7	45	35
C 14A		INT	3	1.38	1.3	29	<20	21	36.8	25.7	79	65
C 14B		INT	3	1.44	1.4	35	89	18	45.4	25.7	66	53
C 15		<1	3	1.46	1.5	30	78	25	41.1	25.7	43	48
C 16A		INT	3	1.39	1.4	24	<20	23	38.5	29.4	56	46
C 16B		INT	2	1.53	1.4	29	<20	21	40.2	25.7	67	60
C 17		INT	2	1.61	1.2	32	78	22	36.0	22.1	64	46
C 18		<1	3	1.38	1.2	29	<20	36	44.5	22.1	67	59
D 14		INT	3	1.56	1.4	39	<20	31	39.4	22.1	86	64
D 15		3	4	1.39	1.3	30	<20	30	42.0	18.4	60	55
D 16		1	3	1.22	1.2	32	70	32	51.4	18.4	87	73
D 17M		INT	3	1.48	1.3	41	94	34	51.4	29.4	68	50
D 17B		2	3	1.44	1.3	33	93	32	51.4	25.7	87	61
D 18		INT	3	1.46	1.4	30	<20	33	39.8	22.1	58	50
D 19A		INT	3	1.48	1.4	30	<20	30	33.2	25.7	75	62
E 14		INT	2	1.41	1.1	36	<20	43	54.2	25.7	93	66
E 15		INT	2	1.79	1.3	44	<20	37	46.3	29.4	100	68
E 16		INT	2	1.30	1.2	53	<20	32	41.1	22.1	75	57
E 17		INT	3	1.61	1.4	44	67	29	36.0	22.1	67	58
E 18		INT	3	1.59	1.5	34	48	25	35.0	18.4	74	64
E 19		INT	3	1.28	1.2	25	<20	18	34.1	25.7	89	69
E 20		INT	3	1.72	1.6	37	<20	28	33.2	22.1	78	62
F 14A		<1	3	1.31	1.1	33	<20	38	57.7	29.4	93	74
F 14B		<1	3	1.41	1.3	37	<20	32	51.6	25.7	79	66
F 15		INT	3	1.53	1.5	39	<20	37	40.2	22.1	74	62
F 16		INT	3	1.37	1.2	30	86	28	45.4	25.7	67	56
F 17		INT	3	1.28	1.2	39	<20	28	36.0	22.1	110	86
F 18		INT	3	1.68	1.6	44	<20	19	34.1	18.4	73	54
F 19		INT	3	1.52	1.5	39	<20	26	29.7	18.4	90	70
F 20		INT	2	1.47	1.2	33	71	27	36.7	25.7	59	50
F 21		INT	3	1.61	1.6	29	<20	25	28.8	18.4	61	60
G 14		INT	3	1.12	0.91	26	110	31	42.8	29.4	110	78
G 15		INT	3	1.39	1.4	31	79	33	42.0	22.1	77	70
G 16		INT	3	1.42	1.3	31	<20	32	42.8	18.8	68	60
G 17		<1	2	1.43	1.4	30	86	29	43.7	18.8	86	66
G 18		INT	2	1.34	1.4	38	<20	28	38.5	18.8	90	77
G 19		<1	3	1.32	1.3	34	120	29	42.8	22.6	68	66
G 20		INT	1	1.27	1.2	28	<20	28	38.5	18.8	70	65
G 21		<1	3	1.27	1.2	32	<20	31	47.1	22.6	99	78
H 14A		INT	2	1.49	1.4	35	<20	29	43.7	26.3	110	100
H 15		INT	2	1.55	1.3	37	<20	22	37.7	22.6	120	93
H 16		<1	<1	1.24	1.0	32	<20	69	54.8	22.6	97	110
H 17		INT	<1	1.23	1.1	31	<20	44	48.0	26.3	82	110
H 18		INT	<1	1.46	1.1	26	91	44	41.1	18.8	75	76
H 19A		INT	<1	1.66	1.5	48	<20	28	30.8	18.8	120	110
H 20		INT	<1	1.51	1.3	32	<20	28	37.7	22.6	84	75
H 21		INT	<1	1.48	1.7	27	<20	35	29.1	15.0	69	85

Site	Lab	Mo (ppm)		Na (%)		Nd (ppm)	Ni (ppm)			Pb (ppm)	Rb (ppm)	
		ACTLABS	B-C	ACTLABS	B-C	ACTLABS	ACTLABS	B-C	DNRE	DNRE	ACTLABS	B-C
J	14	<1	<1	1.73	1.4	56	90	21	32.5	22.6	140	150
J	15	<1	<1	1.39	1.3	38	<20	21	38.5	22.6	99	95
J	16	INT	<1	1.74	1.6	36	<20	<10	27.4	18.8	120	130
J	17	INT	<1	1.43	1.2	34	<20	22	36.8	22.6	100	90
J	18A	INT	<1	2.28	1.8	37	<20	28	25.6	18.9	160	190
J	18B	INT	<1	1.46	1.4	36	<20	35	40.8	26.5	120	160
J	19	<1	<1	1.54	1.3	34	72	47	42.5	18.9	96	92
J	20	INT	<1	1.71	1.6	36	<20	46	31.2	18.9	72	77
J	21	2	<1	1.54	1.5	33	<20	41	40.8	18.9	87	94
J	22	INT	<1	1.83	1.6	35	62	<10	33.0	18.9	86	87
K	14	INT	<1	1.26	1.0	38	<20	36	48.6	22.7	130	110
K	15	INT	<1	1.19	1.0	32	<20	69	55.6	18.9	95	100
K	16	INT	<1	1.37	1.1	28	100	52	51.2	18.9	100	100
K	17A	INT	<1	2.00	1.6	35	<20	35	32.1	26.5	150	170
K	17B	INT	<1	1.43	1.1	33	<20	36	44.3	22.7	91	100
K	18	INT	<1	1.66	1.2	33	<20	51	34.7	18.9	100	100
K	19A	<1	<1	1.65	1.5	35	<20	26	27.8	11.4	88	120
K	19B	<1	<1	1.46	1.2	36	<20	38	44.3	22.7	79	76
K	20	INT	<1	1.43	1.3	32	<20	39	46.0	26.5	100	110
K	21	INT	<1	1.72	1.6	32	<20	32	29.5	11.4	74	65
K	22	<1	<1	1.60	1.5	35	72	49	35.6	18.9	82	84
L	14A	<1	<1	1.69	1.6	53	110	<10	31.2	22.7	120	130
L	15	INT	<1	1.25	1.0	30	<20	42	40.4	18.9	110	110
L	16	INT	<1	1.44	1.2	38	<20	41	40.5	22.4	100	97
L	17	INT	<1	1.63	1.5	37	<20	41	31.0	14.9	83	85
L	18A	INT	<1	1.54	1.3	46	<20	<10	20.7	18.7	100	120
L	18B	INT	<1	1.55	1.0	39	<20	48	42.2	18.7	98	98
L	19A	INT	<1	1.96	1.5	69	70	<10	29.3	18.7	110	110
L	19B	INT	<1	1.63	1.6	39	<20	41	37.1	22.4	120	150
L	20	INT	<1	1.71	1.2	33	<20	28	35.3	18.7	86	77
L	21	<1	<1	1.62	1.6	38	<20	34	37.1	18.7	95	87
L	22	<1	<1	1.55	1.5	37	120	29	41.4	18.7	62	82
M	14A	INT	<1	1.44	1.3	41	<20	58	50.9	22.4	100	100
M	14B	INT	<1	1.34	1.0	46	120	43	47.4	18.7	110	100
M	15A	INT	<1	1.91	1.7	47	<20	31	32.8	18.7	100	95
M	16A	INT	<1	2.00	2.0	53	<20	30	34.5	22.4	86	110
M	17A	INT	<1	1.50	1.2	35	<20	16	29.3	11.2	120	100
M	17B	INT	<1	1.49	1.2	38	<20	23	40.5	18.7	110	100
M	18	INT	<1	1.46	1.1	33	<20	53	42.2	14.9	100	100
M	19L	INT	<1	1.67	1.2	44	92	32	36.2	14.9	90	94
M	20	INT	<1	1.62	1.4	42	<20	36	37.9	14.9	98	98
M	21	<1	<1	1.57	1.5	37	<20	28	36.6	18.7	75	84
M	22	INT	<1	1.66	1.3	28	<20	18	33.2	15.0	72	69
MAX		3	4	2.28	2.0	69	120	69	57.7	29.4	160	190
MIN		<1	0.5	1.12	0.91	24	<20	<10	20.7	11.2	42	35
AVG		-		1.51	1.35	38	-	31	39.2	21.4	87	84
STD		-	-	0.19	0.20	7	-	12	7.2	4.0	23	29
22A		INT	<1	1.83	1.9	40	<20	<10	30.2	20.7	86	96
22Bt		<1	<1	1.46	1.1	36	88	41	51.6	26.3	120	95
22Bm		<1	<1	1.46	1.2	35	<20	39	57.7	26.3	91	100
22Bb		<1	<1	1.40	1.1	32	<20	44	51.6	26.3	110	110

ACTLABS - Activation Laboratories Ltd.
B-C - Bondar-Clegg & Company Ltd.
DNRE - New Brunswick Dept. of Natural Resources and Energy

INT - interelement interference

Appendix C-5. Till Sample Geochemical Data: Sb, Sc, Sm, Sn, Ta, Tb

Site	Lab	Sb (ppm)		Sc (ppm)		Sm (ppm)		Sn (ppm)	Ta (ppm)		Tb (ppm)	
		ACTLABS	B-C	ACTLABS	B-C	ACTLABS	B-C	ACTLABS	ACTLABS	B-C	ACTLABS	B-C
A	16	0.8	0.7	11	11	5.7	7.8	1	1.0	1.2	1.1	1.3
B	14	0.8	0.7	11	12	5.7	7.4	1	<0.5	1.1	0.9	1.3
B	15	0.8	0.8	9.9	12	4.3	5.7	1	1.3	1.1	0.7	0.9
B	16	0.6	0.7	9.2	11	4.5	6.1	1	0.9	1.1	0.8	0.9
B	17	0.6	0.7	9.4	11	4.9	6.5	1	1.4	1.1	0.8	1.1
B	18	0.7	0.6	10	11	5.7	6.9	1	<0.5	0.9	1.0	1.3
C	14A	0.8	0.6	10	11	5.1	5.9	1	0.9	1.1	1.0	0.9
C	14B	0.9	0.8	12	12	6.2	7.3	1	1.3	0.9	1.3	1.2
C	15	0.9	0.8	11	11	5.7	7.3	1	<0.5	1.1	1.1	1.1
C	16A	0.7	0.7	11	12	4.5	5.8	1	0.6	1.0	0.9	1.0
C	16B	0.9	0.8	11	12	5.1	6.1	1	1.3	1.2	0.8	1.0
C	17	0.5	0.5	11	9.0	6.1	6.9	<1	1.5	1.0	1.1	1.1
C	18	0.6	0.7	11	11	5.4	7.2	4	1.1	1.1	1.1	1.2
D	14	0.9	0.8	12	12	6.9	8.0	1	1.1	1.2	1.2	1.4
D	15	0.7	0.6	9.8	10	5.5	6.4	<1	1.5	1.0	0.8	1.0
D	16	1.1	0.9	14	14	5.9	6.8	1	1.1	1.0	0.9	1.0
D	17M	1.0	0.9	12	11	6.9	7.5	1	1.0	1.0	0.9	1.2
D	17B	1.0	0.9	13	13	6.1	6.6	1	1.6	1.0	0.9	0.9
D	18	0.8	0.7	11	11	5.4	6.3	1	0.9	1.2	1.0	1.0
D	19A	0.8	0.7	12	12	6.0	6.9	1	1.1	1.1	1.1	1.2
E	14	1.2	0.9	15	13	6.1	5.8	1	1.2	1.1	1.0	1.0
E	15	1.5	1.0	18	14	8.3	7.5	1	1.6	1.1	1.5	1.2
E	16	1.5	0.7	12	11	11	7.3	1	0.6	1.0	0.7	1.1
E	17	1.0	0.9	12	11	7.1	9.0	1	<0.5	1.3	1.1	1.4
E	18	0.8	0.7	12	12	5.9	7.2	1	1.2	1.2	0.9	1.2
E	19	0.8	0.6	11	10	4.7	5.0	<1	1.1	1.5	0.9	0.8
E	20	0.8	0.7	11	11	6.6	7.8	1	1.6	1.4	1.0	1.3
F	14A	1.4	1.2	17	16	5.8	6.2	1	<0.5	0.9	0.9	0.9
F	14B	1.3	1.2	14	14	6.9	8.2	<1	1.1	1.0	1.0	1.4
F	15	1.0	1.1	13	13	6.9	8.5	1	0.8	1.4	1.0	1.4
F	16	1.1	0.9	12	11	5.4	6.7	1	<0.5	1.0	0.8	0.8
F	17	0.6	0.4	11	11	6.6	7.1	1	<0.5	1.6	1.2	1.3
F	18	0.6	0.6	11	11	7.9	9.2	1	1.2	1.2	1.4	1.5
F	19	0.6	0.5	13	14	6.7	8.5	1	<0.5	1.3	1.1	1.4
F	20	0.8	0.7	11	10	5.9	6.6	1	0.8	1.0	1.1	1.2
F	21	0.9	0.9	11	11	5.6	8.3	<1	1.6	1.3	0.8	1.5
G	14	0.9	0.6	12	10	4.9	4.6	1	1.8	1.4	0.9	0.7
G	15	1.2	1.0	11	12	5.2	5.9	1	0.8	1.4	0.8	1.1
G	16	0.9	0.8	12	12	5.5	6.3	1	1.4	1.2	0.9	1.1
G	17	1.0	0.9	12	12	5.2	6.4	<1	<0.5	1.2	0.8	1.0
G	18	0.9	0.9	13	15	6.1	7.5	2	1.1	1.4	1.1	1.3
G	19	0.9	0.9	12	12	5.6	6.8	1	1.6	1.2	0.8	1.1
G	20	0.8	0.7	12	12	4.7	5.5	1	0.9	1.0	0.7	0.9
G	21	0.8	0.8	14	13	5.8	6.2	1	1.5	1.1	1.1	1.0
H	14A	1.0	0.7	12	12	6.6	7.6	1	2.2	1.9	1.3	1.4
H	15	1.2	0.7	9.3	8.3	6.7	7.1	<1	1.7	2.1	0.9	1.1
H	16	1.1	1.3	13	11	5.4	7.5	1	1.7	1.6	0.8	1.0
H	17	1.1	1.1	13	12	5.7	7.7	1	1.3	1.7	1.0	1.0
H	18	1.0	0.8	12	10	5.9	5.6	1	<0.5	1.4	0.8	0.7
H	19A	0.8	0.7	12	11	10	10.5	1	<0.5	2.9	1.8	1.5
H	20	0.9	0.9	12	10	7.2	7.3	1	<0.5	1.1	1.1	0.9
H	21	0.7	0.7	9.9	11	6.1	7.9	1	<0.5	1.4	0.8	1.1

Site Lab	Sb (ppm)		Sc (ppm)		Sm (ppm)		Sn (ppm)	Ta (ppm)		Tb (ppm)	
	ACTLABS	B-C	ACTLABS	B-C	ACTLABS	B-C	ACTLABS	ACTLABS	B-C	ACTLABS	B-C
J 14	1.1	0.9	17	14	13	11.8	<1	2.9	2.4	2.0	1.9
J 15	1.1	1.1	13	12	8.1	8.5	1	1.7	1.4	1.2	1.3
J 16	0.6	0.7	10	9.4	8.5	9.5	1	2.4	2.6	<0.5	1.4
J 17	0.9	0.9	12	9.4	7.0	7.1	1	0.8	1.4	<0.5	1.0
J 18A	1.8	1.1	7.7	6.1	8.5	10.2	<1	2.5	3.7	1.4	1.8
J 18B	1.0	1.4	12	12	8.0	10.2	<1	1.4	2.6	1.2	1.4
J 19	1.2	1.2	14	12	7.4	8.0	1	1.3	1.5	1.1	1.1
J 20	0.8	0.8	12	12	8.0	10.0	1	1.1	1.4	1.5	1.5
J 21	0.9	0.9	12	12	7.3	8.9	1	<0.5	1.5	<0.5	1.3
J 22	0.9	0.8	10	9.0	7.6	8.2	1	1.0	1.8	1.2	1.2
K 14	1.1	1.0	16	13	7.5	7.4	1	<0.5	1.4	1.1	1.1
K 15	1.0	1.1	13	12	7.0	7.7	1	<0.5	1.3	0.9	0.9
K 16	1.3	1.1	15	12	7.0	7.1	1	1.6	1.5	1.1	1.0
K 17A	1.0	0.8	11	9.4	8.1	8.2	<1	2.1	2.6	1.3	1.2
K 17B	1.3	1.1	16	11	7.7	7.6	1	<0.5	1.6	0.9	1.1
K 18	1.0	1.0	13	9.0	7.7	8.3	1	1.6	1.7	1.0	1.0
K 19A	0.6	0.5	9.2	8.3	7.8	9.2	1	2.0	2.1	<0.5	1.3
K 19B	1.3	1.2	14	11	6.8	7.3	1	<0.5	1.2	<0.5	1.1
K 20	1.5	1.5	14	13	8.1	9.3	1	<0.5	1.6	1.2	1.5
K 21	0.7	0.8	10	9.1	7.6	8.4	1	0.8	1.3	1.0	1.3
K 22	0.7	0.8	11	11	6.9	8.1	2	<0.5	1.1	<0.5	1.0
L 14A	0.9	0.9	13	12	12	12.9	2	1.2	2.8	1.5	1.9
L 15	0.9	0.7	13	11	6.8	6.5	1	1.0	1.3	0.9	0.9
L 16	1.1	1.0	15	12	7.8	8.0	1	1.4	1.5	0.9	1.1
L 17	0.7	0.7	11	10	8.0	9.4	1	<0.5	1.6	1.0	1.2
L 18A	0.9	0.6	10	8.3	9.4	9.0	1	1.8	1.8	1.6	1.6
L 18B	1.1	1.0	14	9.3	8.2	7.9	1	<0.5	1.4	0.9	1.1
L 19A	1.1	1.0	14	11	17	18.2	<1	<0.5	2.4	<0.5	2.9
L 19B	1.2	1.1	14	12	8.4	9.5	1	1.8	1.8	1.2	1.4
L 20	0.9	0.7	11	10	7.2	7.6	1	<0.5	1.1	1.0	0.9
L 21	0.8	0.9	13	10	8.1	7.6	1	1.1	1.4	1.0	1.1
L 22	0.9	0.9	11	11	8.0	8.9	1	1.0	1.3	1.2	1.3
M 14A	1.1	1.0	14	13	9.1	9.5	1	1.4	1.4	<0.5	1.2
M 14B	1.2	1.0	17	13	8.9	7.8	1	1.0	1.3	1.1	0.9
M 15A	0.9	0.9	13	11	10	10.7	<1	1.7	2.0	1.5	1.6
M 16A	1.3	1.2	12	12	13	14.6	1	1.9	1.8	2.0	2.2
M 17A	0.9	0.5	12	10	7.3	6.8	<1	1.5	1.6	1.0	0.9
M 17B	1.0	0.9	15	12	8.6	8.3	2	1.4	1.6	1.1	1.1
M 18	0.7	0.7	12	9.0	7.6	7.7	<1	1.5	1.5	1.3	1.0
M 19L	1.1	1.0	13	10	8.3	8.4	1	<0.5	1.5	1.3	1.1
M 20	1.0	0.8	13	11	8.3	8.7	1	<0.5	1.4	1.3	1.2
M 21	1.2	1.2	13	12	7.9	9.0	1	1.0	1.3	<0.5	1.3
M 22	0.9	0.8	11	8.9	7.2	7.0	1	<0.5	1.4	1.2	1.1
MAX	1.8	1.5	18	16	17	18.2	4	2.9	3.7	2.0	2.9
MIN	0.5	0.4	7.7	6.1	4.3	4.6	<1	<0.5	0.9	<0.5	0.7
AVG	1.0	0.9	12.2	11.3	7.1	7.9	1	1.1	1.4	1.0	1.2
STD	0.2	0.2	1.9	1.6	2.0	1.8	-	0.6	0.5	0.3	0.3
22A	0.9	0.9	9.3	10	8.7	10.8	1	1.1	1.8	1.2	1.7
22Bt	1.4	1.1	17	13	7.6	7.1	1	1.1	1.1	<0.5	1.0
22Bm	1.2	1.2	17	14	7.8	7.8	<1	0.7	1.3	<0.5	1.1
22Bb	1.1	1.2	18	14	7.3	7.0	<1	<0.5	1.1	<0.5	0.9

ACTLABS - Activation Laboratories Ltd.
B-C - Bondar-Clegg & Company Ltd.

Appendix C-6. Till Sample Geochemical Data: Th, U, W, Yb, Zn, Zr

Site	Lab	Th (ppm) ACTLABS	Th (ppm) B-C	U (ppm) ACTLABS	U (ppm) B-C	W (ppm) ACTLABS	W (ppm) B-C	Yb (ppm) ACTLABS	Yb (ppm) B-C	Zn (ppm) ACTLABS	Zn (ppm) DNRE	Zr (ppm) B-C
A	16	11	12	2.2	3.3	<1	1	3.4	3	71	50.0	500
B	14	9.8	10	2.7	2.9	<1	1	3.3	4	95	52.0	400
B	15	9.3	9.3	2.5	2.2	<1	1	2.5	3	80	46.0	340
B	16	9.4	10	2.6	2.5	<1	1	2.7	3	82	40.0	280
B	17	9.1	10	2.3	3.3	<1	1	3.3	4	64	42.0	350
B	18	11	10	3.3	3.3	<1	1	3.4	4	80	36.0	360
C	14A	13	12	3.8	3.6	3	2	3.3	3	<50	44.0	290
C	14B	11	10	2.5	2.5	2	1	3.6	3	72	48.0	400
C	15	9.4	9.3	2.3	2.5	<1	<1	3.3	3	81	42.0	310
C	16A	10	10	3.3	3.4	<1	<1	3.2	4	53	38.0	670
C	16B	12	11	3.6	3.5	<1	<1	3.1	3	107	46.0	480
C	17	11	10	4.3	3.5	<1	1	4.1	3	51	38.0	510
C	18	11	11	2.8	3.1	<1	1	3.3	3	<50	44.0	490
D	14	13	12	13	14	<1	1	4.2	4	64	40.0	480
D	15	12	11	3.1	3.3	<1	<1	3.5	3	109	52.0	430
D	16	11	10	2.4	2.5	<1	<1	3.3	3	81	56.0	<200
D	17M	14	11	3.7	2.9	2	1	3.9	3	100	46.0	380
D	17B	11	9.3	1.8	2.4	1	1	3.3	3	73	52.0	280
D	18	11	10	2.4	2.8	<1	1	3.5	3	61	39.0	490
D	19A	11	9.5	3.1	2.8	<1	1	4.0	4	86	55.8	500
E	14	12	9.3	3.0	2.5	<1	<1	3.3	2	104	63.5	<200
E	15	15	10	3.8	2.7	4	1	5.3	3	104	57.7	270
E	16	13	11	8.3	2.9	2	1	4.9	3	242	44.2	420
E	17	13	13	3.9	3.8	<1	1	4.3	3	73	40.4	570
E	18	12	11	3.4	3.2	<1	2	3.5	3	69	48.1	380
E	19	11	9.1	3.3	2.9	3	2	3.0	3	102	76.9	<200
E	20	14	13	4.2	3.8	<1	2	4.1	4	75	46.2	500
F	14A	13	11	3.2	3.2	<1	1	3.0	3	93	63.5	270
F	14B	13	12	3.4	3.3	<1	<1	4.0	4	115	57.7	390
F	15	13	13	3.6	3.9	<1	1	3.9	4	56	50.0	460
F	16	12	10	3.0	2.5	<1	<1	3.1	3	91	57.7	290
F	17	14	12	4.7	4.0	<1	1	3.5	3	76	55.8	330
F	18	14	13	3.8	3.9	<1	<1	4.9	5	70	40.4	590
F	19	14	13	4.8	5.1	<1	1	4.3	4	101	46.2	460
F	20	13	11	2.9	3.3	<1	1	3.7	3	82	44.2	400
F	21	9.7	11	2.7	3.2	<1	1	3.4	3	<50	38.5	480
G	14	14	10	4.4	3.4	<1	2	2.8	<2	112	73.1	270
G	15	14	13	11	12	<1	1	3.4	3	81	51.0	440
G	16	12	11	6.7	6.8	<1	<1	3.3	3	74	44.9	360
G	17	11	10	2.8	2.8	<1	<1	3.0	3	75	48.8	230
G	18	13	13	2.9	3.2	<1	1	3.4	3	93	48.8	340
G	19	12	11	2.5	2.5	<1	1	3.1	3	96	48.8	250
G	20	10	10	2.6	2.7	<1	1	3.0	3	112	44.9	280
G	21	12	10	3.4	3.3	<1	1	3.7	4	93	60.6	310
H	14A	17	15	5.1	4.6	5	2	4.2	4	59	62.5	320
H	15	20	17	3.4	4.1	<1	2	3.9	2	88	60.6	330
H	16	12	11	3.1	4.1	<1	2	3.1	2	106	60.6	<200
H	17	13	11	2.5	3.8	<1	1	3.3	3	93	60.6	<200
H	18	11	7.7	5.6	5.9	<1	1	3.2	2	67	48.8	<200
H	19A	31	24.2	8.0	9.1	<1	2	5.9	5	97	54.7	250
H	20	13	9.2	4.6	6.1	<1	1	4.0	3	61	39.1	<200
H	21	9.7	9.4	3.4	5.3	<1	2	3.6	4	93	39.1	270

Site Lab	Th (ppm)		U (ppm)		W (ppm)		Yb (ppm)		Zn (ppm)		Zr (ppm)
	ACTLABS	B-C	ACTLABS	B-C	ACTLABS	B-C	ACTLABS	B-C	ACTLABS	DNRE	B-C
J 14	26	18	6.8	7.0	<1	2	8.0	7	138	84.0	430
J 15	15	12	3.8	4.4	<1	2	4.5	4	77	44.9	260
J 16	21	16	8.1	10	<1	4	4.6	4	82	43.0	250
J 17	13	10	3.2	4.3	<1	1	3.9	4	83	46.9	290
J 18A	24	25.1	6.0	8.5	<1	5	5.7	4	63	44.2	210
J 18B	16	18	3.7	5.7	<1	3	4.4	4	87	55.8	<200
J 19	13	13	3.0	3.9	<1	2	4.4	4	79	46.2	220
J 20	13	14	5.1	6.9	<1	<1	4.8	4	<50	30.8	370
J 21	12	11	3.2	5.3	<1	2	4.0	4	65	46.2	320
J 22	17	12	4.4	5.5	<1	2	4.9	4	59	38.5	270
K 14	15	10	4.1	3.9	<1	1	4.3	4	87	61.5	250
K 15	12	10	3.1	4.4	<1	2	4.0	4	86	59.6	230
K 16	14	10	3.3	3.7	<1	1	3.7	3	129	75.0	270
K 17A	21	16	6.0	7.7	<1	2	4.5	4	78	55.8	230
K 17B	14	10	3.1	3.7	7	<1	4.2	3	122	55.8	<200
K 18	15	11	3.9	4.4	<1	2	4.2	3	67	44.2	330
K 19A	15	13	3.3	5.4	<1	2	4.4	4	79	46.2	360
K 19B	12	9.0	3.2	3.2	<1	<1	4.0	3	85	48.1	210
K 20	14	11	8.3	9.0	<1	2	5.3	4	92	55.8	<200
K 21	12	10	8.8	11	<1	<1	4.7	4	60	36.5	300
K 22	12	9.2	3.2	4.0	<1	1	3.7	4	65	40.4	<200
L 14A	26	20.6	5.4	7.6	<1	2	6.9	6	111	61.5	470
L 15	13	9.1	4.6	5.3	<1	1	3.8	3	96	67.3	<200
L 16	14	11	3.7	3.6	<1	2	4.5	4	83	52.7	260
L 17	14	12	13	16	<1	<1	4.6	4	67	39.1	<200
L 18A	16	11	43	47.3	<1	3	5.3	4	50	31.2	<200
L 18B	17	11	4.7	5.2	<1	1	4.6	3	56	50.8	<200
L 19A	29	22.5	7.3	10	<1	2	10.7	7	<50	43.0	400
L 19B	15	12	4.0	5.1	<1	2	5.1	5	91	56.6	<200
L 20	15	9.2	4.9	3.7	<1	1	4.5	3	92	46.9	<200
L 21	14	12	3.8	5.5	<1	1	4.6	4	61	48.8	300
L 22	15	12	3.6	4.7	<1	<1	4.7	4	55	43.0	320
M 14A	17	13	3.6	5.0	<1	2	5.2	4	92	56.6	270
M 14B	17	11	3.9	3.8	<1	2	4.7	3	107	64.4	220
M 15A	23	16	8.1	10	<1	2	6.4	6	<50	52.7	330
M 16A	26	22.3	7.2	8.9	<1	2	8.0	8	54	46.9	540
M 17A	13	9.0	6.2	6.6	<1	1	4.0	3	117	62.5	240
M 17B	16	11	8.1	9.4	<1	2	4.5	3	103	56.6	230
M 18	14	10	3.7	4.7	<1	<1	4.1	3	<50	62.5	<200
M 19L	17	12	8.5	8.7	<1	2	4.4	3	84	50.8	<200
M 20	16	12	5.0	5.1	<1	1	4.8	4	<50	46.9	230
M 21	13	11	2.1	4.1	<1	<1	4.1	4	73	44.0	380
M 22	13	9.1	3.5	3.4	<1	1	4.1	3	67	43.2	260

MAX	31	25.1	43	47.3	7	5	10.7	8	242	84.0	670
MIN	9.1	7.7	1.8	2.2	<1	<1	2.5	<2	<50	30.8	<200
AVG	14.2	11.9	4.8	5.4	-	1	4.2	4	80	50.2	300
STD	4.2	3.3	4.5	5.1	-	1	1.2	1	29	9.8	140

22A	16	19	4.0	6.7	<1	4	5.7	5	60	48.9	360
22Bt	12	8.2	3.1	3.0	<1	1	4.5	4	98	73.3	230
22Bm	11	8.4	2.7	2.9	<1	1	4.6	4	134	77.1	210
22Bb	13	9.3	3.6	3.5	<1	1	4.5	3	91	71.4	<200

ACTLABS - Activation Laboratories Ltd.
B-C - Bondar-Clegg & Company Ltd.
DNRE - New Brunswick Dept. of Natural Resources and Energy

APPENDIX D. TILL GRAIN SIZE AND LITHOLOGIC COMPOSITION OF PEBBLES, FOREST CITY (21 G/12)

APPENDIX D. TILL GRAIN SIZE AND LITHOLOGIC COMPOSITION OF PEBBLES, FOREST CITY (21 G/12)

Site	Clay (%)	Silt (%)	Sand (%)	Sed (%)	Gran (%)	Maf (%)	FV (%)	Qtz (%)
B 14	16	43	41	68	4	19	5	4
B 15	27	32	41	73	0	14	7	6
B 16	18	35	47	80	3	12	4	1
B 17	15	36	49	69	8	18	4	0
B 18	7	21	72	68	7	15	7	2
C 14A	14	33	53	6	89	4	1	0
C 14B	18	36	46	80	2	11	7	0
C 15	26	35	39	78	0	12	6	4
C 16A	8	8	84	84	4	9	2	1
C 16B	14	30	56	42	37	15	4	2
C 17	10	30	60	62	7	22	5	3
C 18	16	28	56	69	6	16	8	1
D 14	16	36	48	53	38	6	2	1
D 15	7.5	13	79.5	80	5	8	3	3
D 16	32	27	41	80	0	16	4	0
D 17M	13	29	58	76	5	10	6	3
D 17B	26	28	46	76	5	15	4	0
D 18	14	32	54	71	11	12	5	1
D 19A	10	21	69	68	8	14	8	1
E 14	32	36	32	76	2	8	10	4
E 15	26	30	44	58	14	16	9	3
E 16	19.5	37.5	43	75	6	2	13	4
E 17	13	29	58	71	4	11	10	4
E 18	19	37	44	64	11	11	11	3
E 19	16	32	52	16	82	2	0	0
E 20	11	36	53	39	53	7	1	0
F 14A	15	25	60	53	26	12	7	2
F 14B	18	38	44	88	0	6	4	2
F 15	10	33	57	45	37	10	4	5
F 16	18	30	52	82	9	6	3	1
F 17	13	26	61	33	59	4	0	4
F 18	9	27	64	66	4	19	6	3
F 19	16	41	43	74	2	16	8	0
F 20	12	25	63	50	26	13	11	0
F 21	22	35	43	70	4	18	8	0
G 14	16	26	58	13	83	0	3	1
G 15	18	28	54	75	15	5	4	1
G 16	16	28	56	80	3	13	1	3
G 17	26	37	37	88	1	5	2	4
G 18	29	33	38	65	13	16	6	0
G 19	26	36	38	66	8	8	15	3
G 20	24	36	40	67	6	20	6	0
G 21	14	12	74	55	32	9	3	1
H 14A	12	14	74	24	62	11	2	1
H 15	12	32	56	23	72	2	3	0
H 16	24	28	48	77	7	10	3	2
H 17	34	29	37	55	39	6	0	0
H 18	28	34	38	76	2	10	10	2
H 19A	10	19	71	5	94	1	0	0
H 20	21	33	46	65	8	14	14	0
H 21	18	42	40	81	1	13	4	1

Site	Clay (%)	Silt (%)	Sand (%)	Sed (%)	Gran (%)	Maf (%)	FV (%)	Qtz (%)
J 14	9	13	78	32	57	7	1	2
J 15	9	21.5	69.5	69	10	15	2	4
J 16	9	34	57	25	69	4	2	0
J 17	23	28	49	67	10	19	2	2
J 18A	6	15	79	5	93	2	0	0
J 18B	18	27	55	53	31	11	3	2
J 19	23	36	41	50	33	13	3	1
J 20	12	32	56	77	4	13	5	1
J 21	24	31	45	78	6	16	0	0
J 22	12	36	52	17	75	4	3	1
K 14	24	28	48	52	26	16	4	2
K 15	20	36	44	87	3	4	1	5
K 16	29	28	43	70	4	20	6	0
K 17A	5.5	6.5	88	47	29	14	10	0
K 17B	27	28	45	60	15	15	6	4
K 18	23	35	42	48	32	16	4	0
K 19A	10	24	66	30	58	9	2	1
K 19B	23	37	40	85	2	10	3	0
K 20	10	14	76	60	24	11	5	0
K 21	8	35	57	73	4	14	6	2
K 22	22	40	38	75	2	15	5	3
L 14A	5.5	9.5	85	7	91	1	0	1
L 15	16	31	53	64	18	11	4	3
L 16	26	28	46	60	6	24	8	0
L 17	16	37	47	68	8	20	0	4
L 18A	12	46	42	0	100	0	0	0
L 18B	18.5	26.5	55	55	23	16	2	4
L 19A	4	9	87	47	37	9	6	1
L 19B	25	27	48	45	29	16	8	2
L 20	8	27	65	73	1	10	11	4
L 21	16	38	46	59	17	20	3	1
L 22	11	25	64	71	9	10	9	1
M 14A	13	30	57	71	19	7	0	3
M 14B	20	19	61	50	29	15	4	2
M 15A	7	16	77	30	66	4	0	0
M 16A	4.5	11.5	84	50	35	11	3	1
M 17A	18	33	49	20	68	9	2	1
M 17B	24	31	45	74	8	14	0	4
M 18	13	29	58	71	13	10	6	0
M 19L	18	57	25	36	58	6	0	0
M 20	14	30	56	63	13	17	5	1
M 21	12	31	57	75	6	10	5	4
M 22	12	33	55	74	6	16	2	2

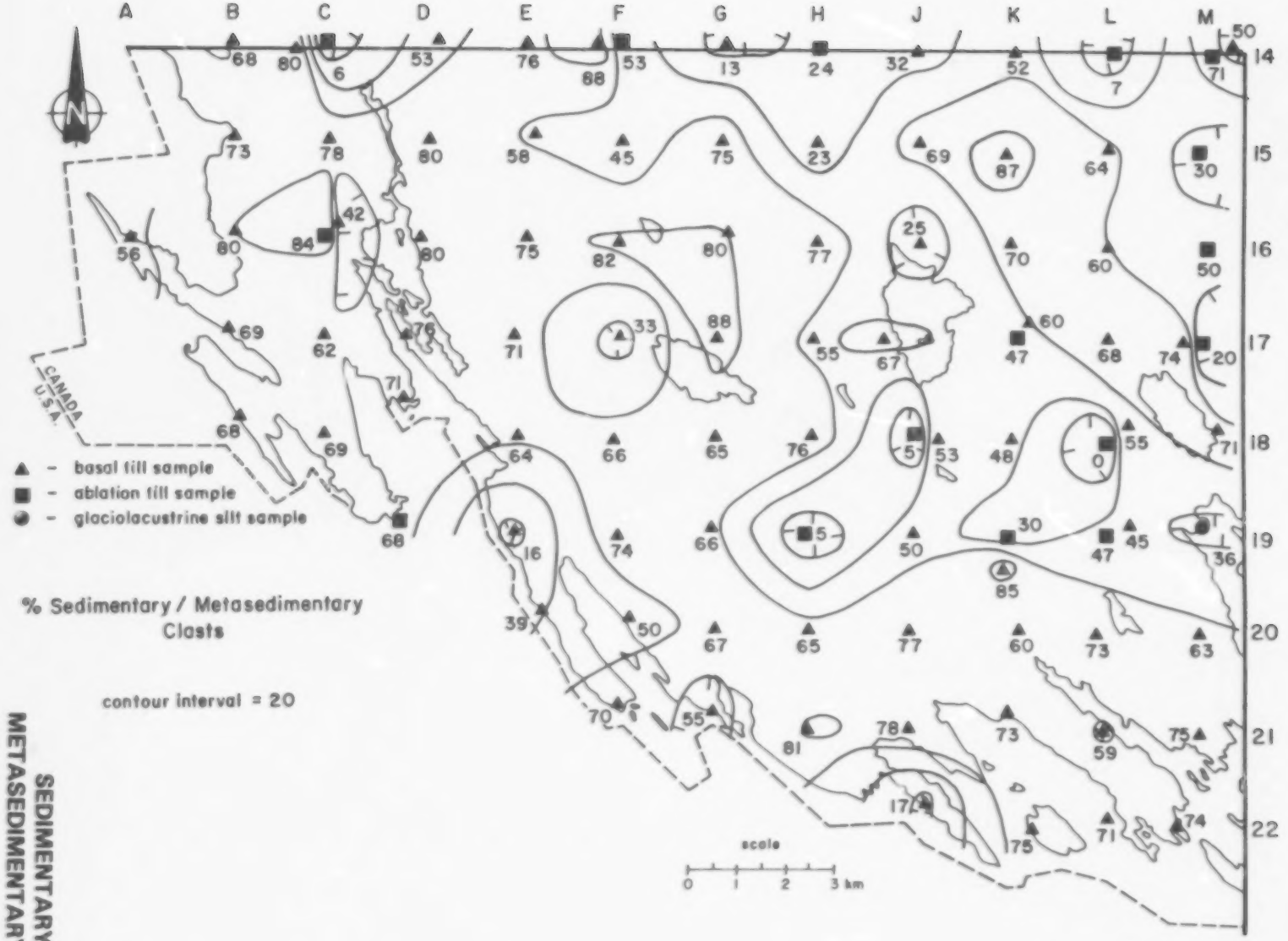
MAX	34	57	88	88	100	24	15	6
MIN	4	6.5	25	0	0	0	0	0
AVG	17	29	54	58	24	11	5	2
STD	7	9	13	22	27	5	3	2

22A	5	30	65	10	86	3	0	1
22Bt	32	32	36	70	9	15	5	1
22Bm	34	34	32	72	7	11	10	0
22Bb	34	29	37	63	13	15	7	1

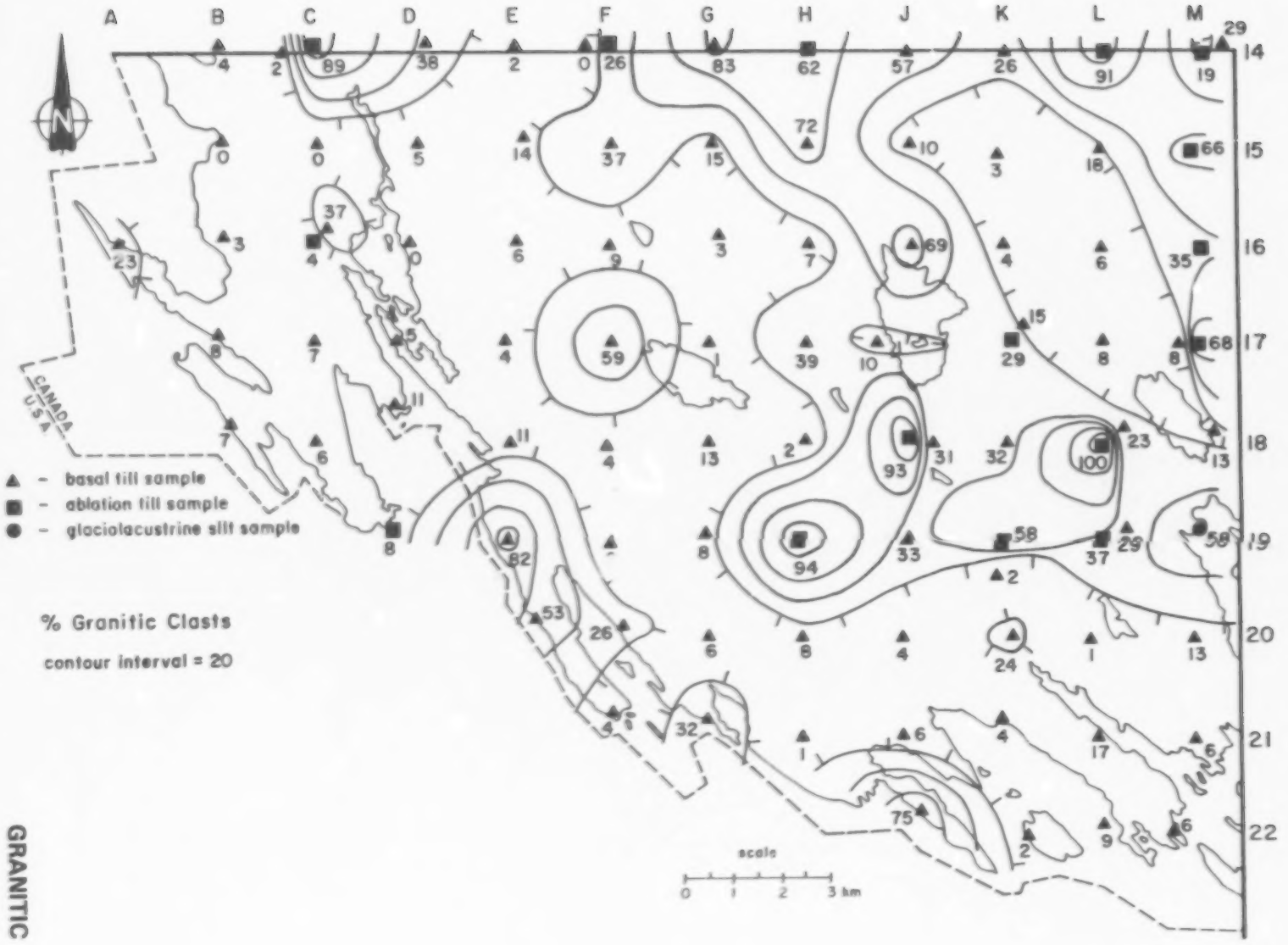
Pebble lithologies:
Sed - sedimentary; **Gran** - granitic; **Maf** - mafic; **FV** - felsic volcanic; **Qtz** - quartz.

APPENDIX E. MAJOR LITHOTYPE DISTRIBUTION MAPS, FOREST CITY (21 G/12)

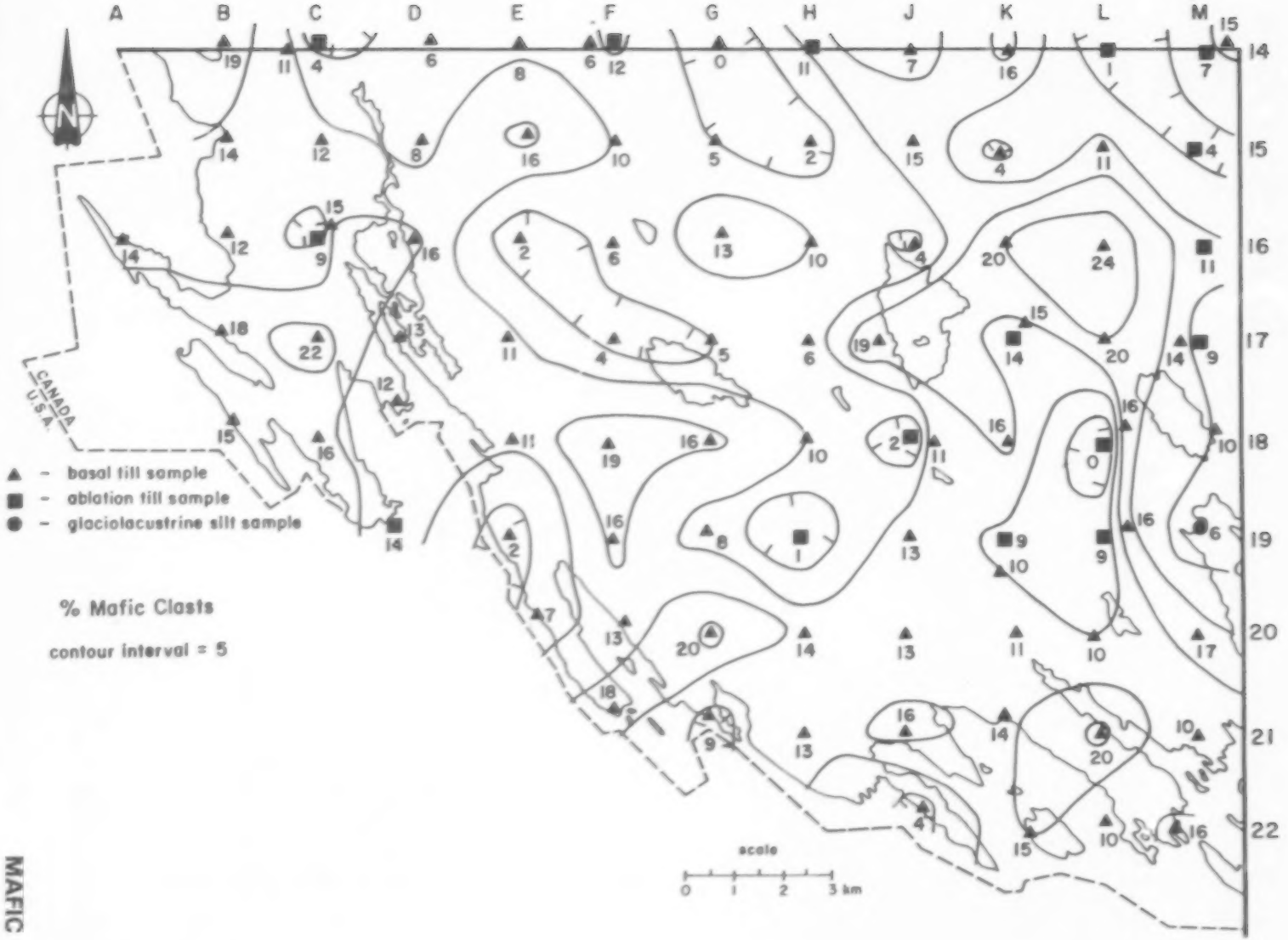
Sedimentary/Metasedimentary Clasts 85
Granitic Clasts 86
Mafic Clasts 87
Felsic Volcanic Clasts 88



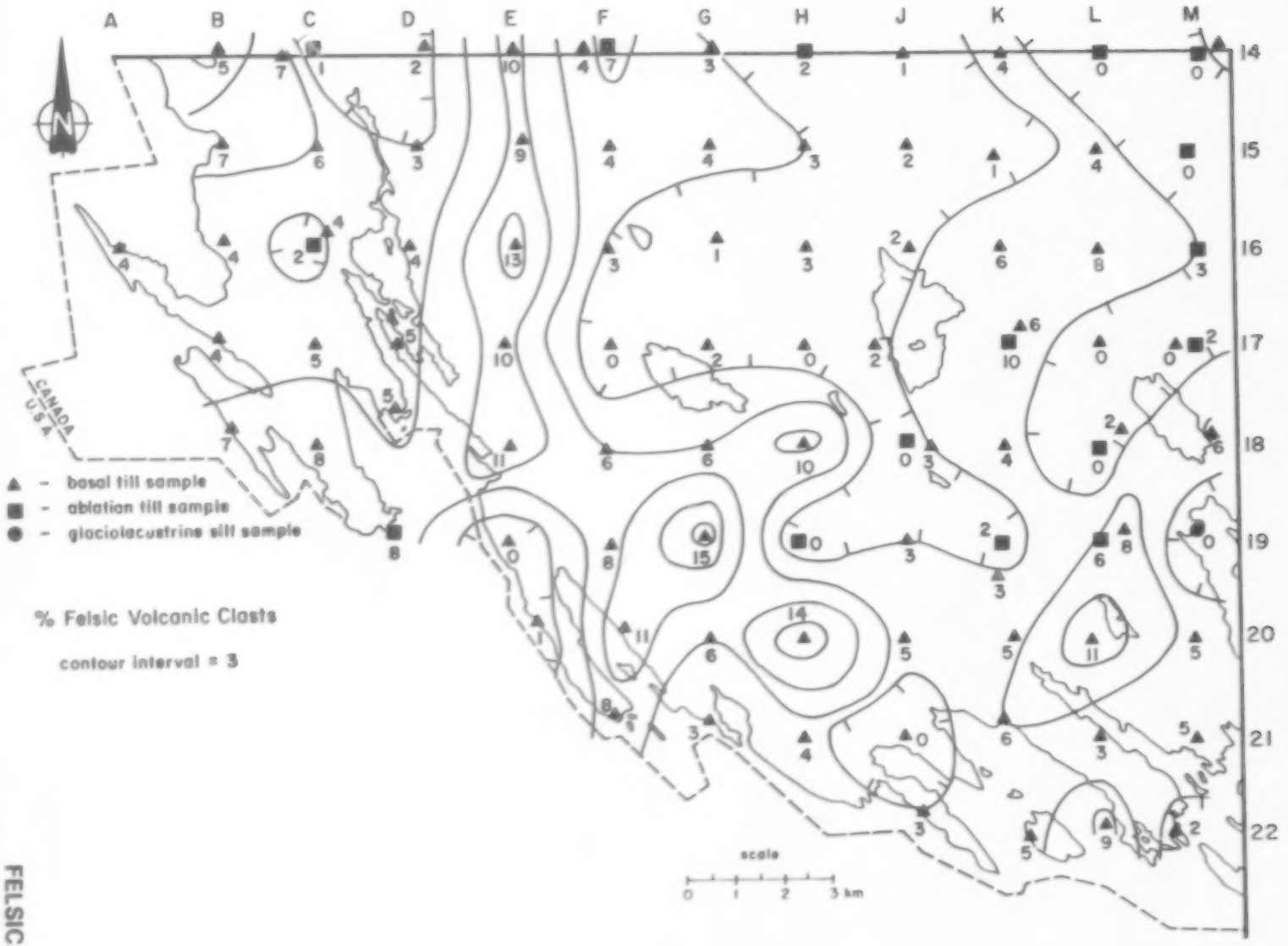
SEDIMENTARY/ METASEDIMENTARY


A
B
C
D
E
F
G
H
J
K
L
M
14
15
16
17
18
19
20
21
22
N
CANADA
USA
▲ – basal till sample
■ – ablation till sample
● – glaciolacustrine silt sample
% Granitic Clasts
contour interval = 20
scale
0 1 2 3 km

GRANITIC


A
B
C
D
E
F
G
H
J
K
L
M
14
15
16
17
18
19
20
21
22
N
CANADA
U.S.A.
▲ - basal till sample
■ - ablation till sample
● - glaciolacustrine silt sample
% Mafic Clasts
contour interval = 5
scale
0 1 2 3 km

MAFIC



FELSIC VOLCANIC